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NATURAL RESOURCES

Missouri Air Quality Trends

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St. Louis Area Monitoring Agencies
May 21, 2019, St. Louis, Mo.

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Presentation Overview

- Emissions Inventory and Trends
- Ambient Air Monitoring and Trends
- Website Resources

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National Emissions Inventory (NEI) Source Categories and Examples

- Point- power plants, factories, etc…
- Nonpoint- residential heating, etc…
- Onroad- cars, trucks, etc…
- Nonroad- lawn mowers, locomotives, etc…
- Event- prescribed burns, wildfires, etc…

Complete data source category list:
https://www.epa.gov/air-emissions-inventories/air-emissions-sources

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Point Source Emissions Reporting

10 CSR 10-6.110 Emissions Data Reporting Rule (EIQ Rule)

- Part 70 - Full Emissions Report- Annually
  - potential to emit more than 100 tons per year of any criteria pollutants or
  - 10 tons per year of a single Hazardous air pollutant or
  - 25 tons per year of a combination of Hazardous air pollutants
- Intermediate - Full Emissions Report - every three years, otherwise reduced* reporting
  - potential to emit more than 100 tons per year of any criteria pollutants but accepted an emission limit of less than 100 tons per year

*Full Emissions Report is required if there is a 5 tons per year change in emissions or if there is a construction permit action.

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Point Source Emissions Reporting

- Small sources - Full once, reduced* subsequently
  - Basic Operating Permit - potential to emit is greater than de minimis levels but less than 100 tons per year.
  - Construction permit only - Construction Permit limits actual emissions to be below de minimis levels.

de minimis Levels: PM_{10} = 15 tons, $PM_{2.5}$ 10 tons, SO_x, NO_x, VOC = 40 tons, CO = 100 tons, Lead = 0.6 tons, HAPs = 10 tons each/25 tons combined

*Full Emissions Report is required if there is a 5 tons per year change in emissions or if there is a construction permit action

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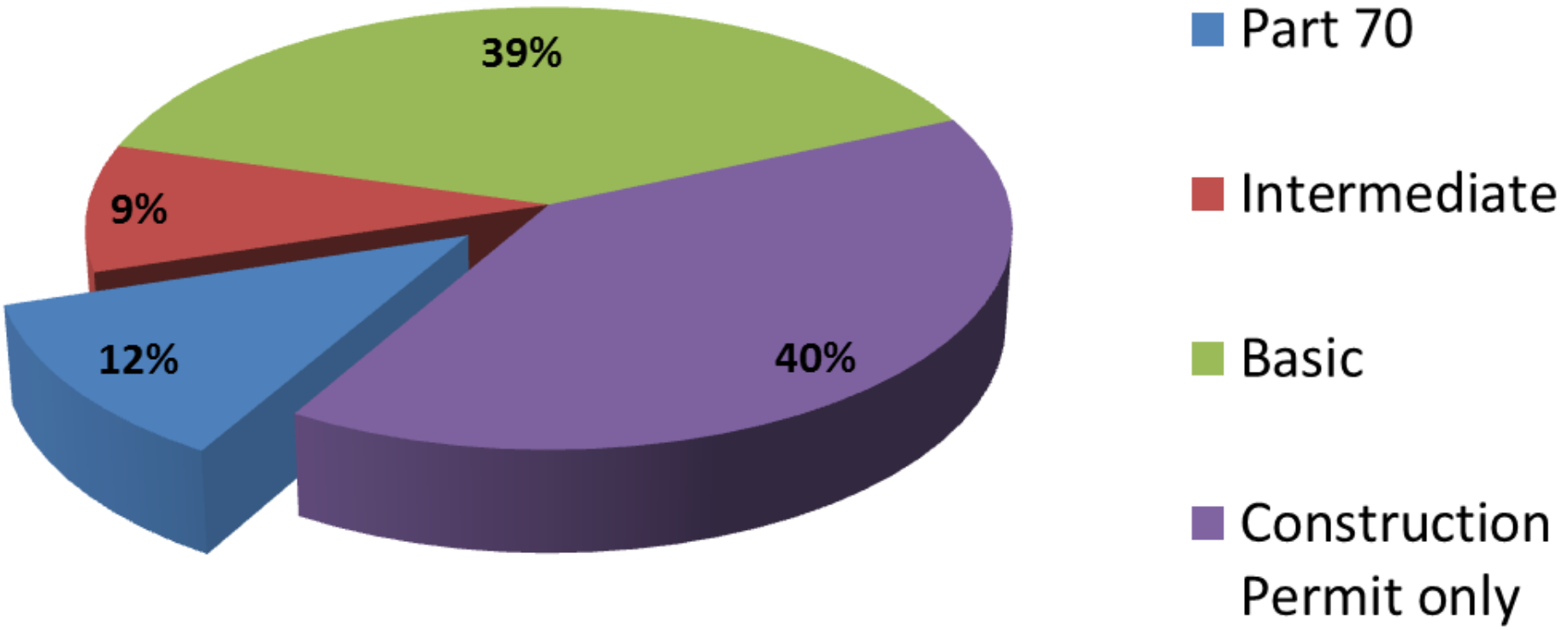
How many point source facilities?

Permit Type	Type of 2017 EIQ (12/14/17)		Total Number
	Full	Reduced	
Part 70	258	0	258
Intermediate	202	0	202
Basic	23	788	811
Construction Permit only*	111	800	911
All permit types	**594**	**1,588**	**2,182**

*Construction permit limits emissions below De Minimis permit applicability limits. (CP-NOP)

Permit Type as a Percent of Total Facilities
2017 Emissions Year



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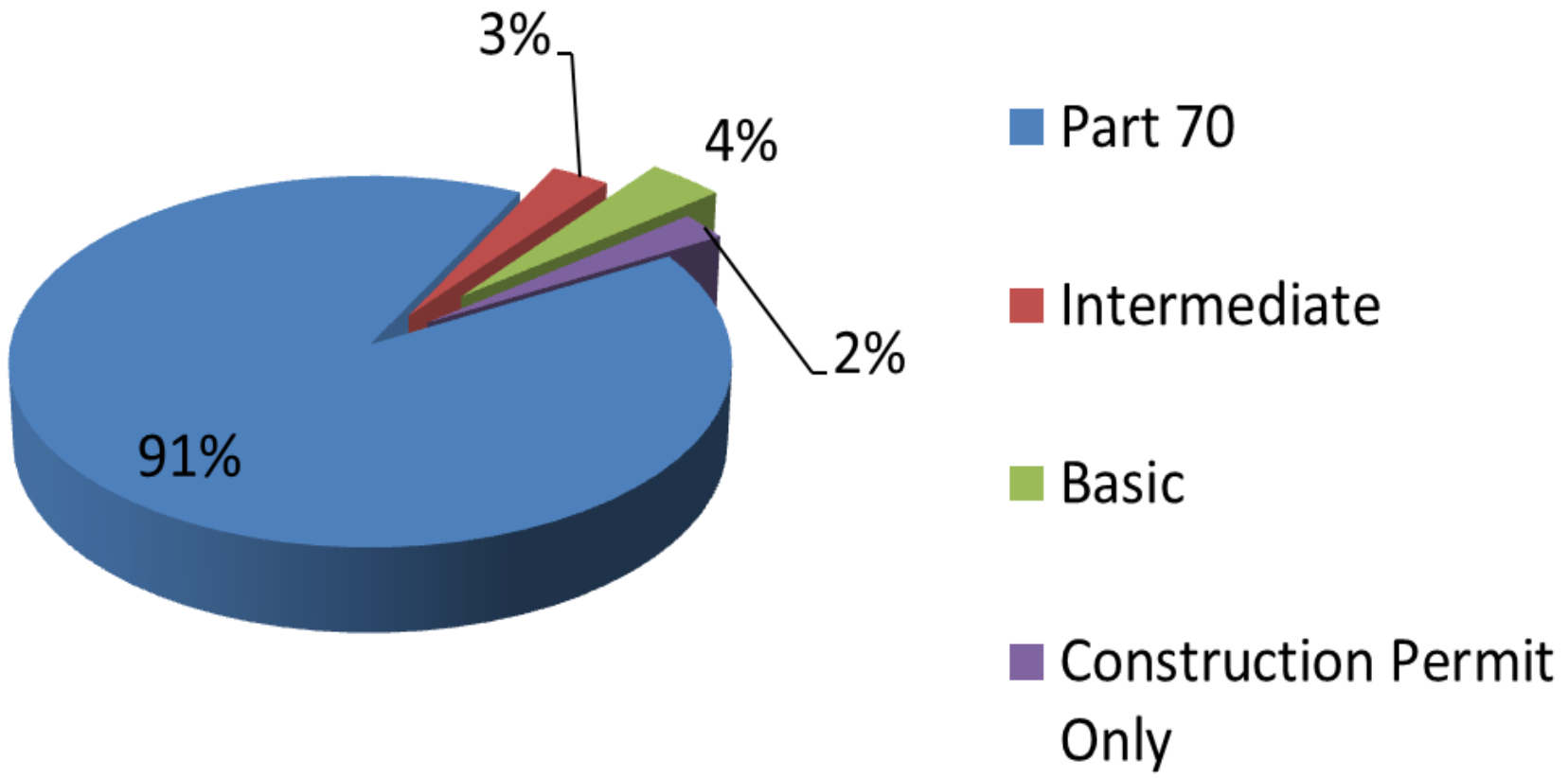
Percentage of Emissions Fees Collected by Permit Type

2017 Emissions Year



~$6.6 Million

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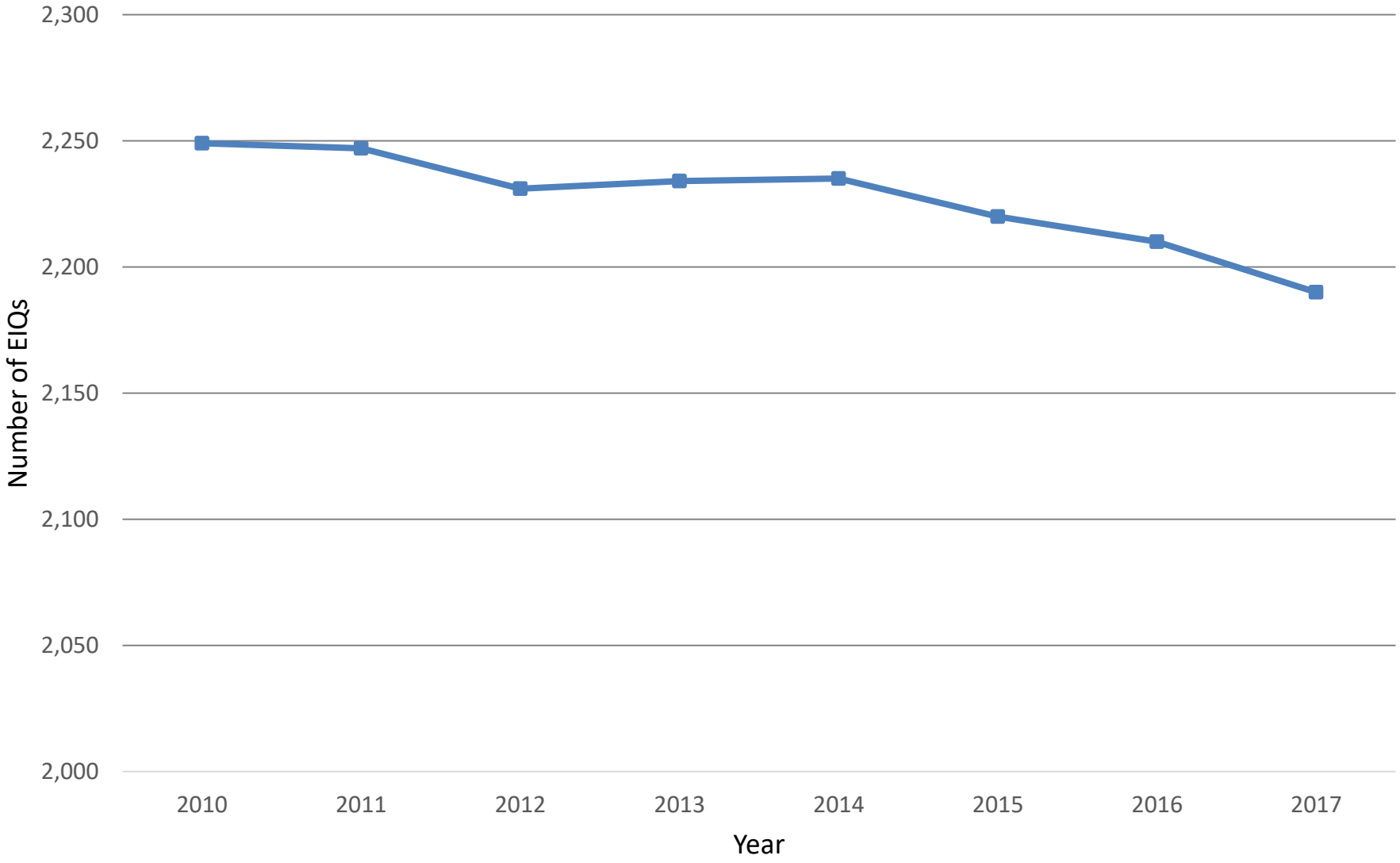
Total Emissions Inventory Questionnaires Collected by Year



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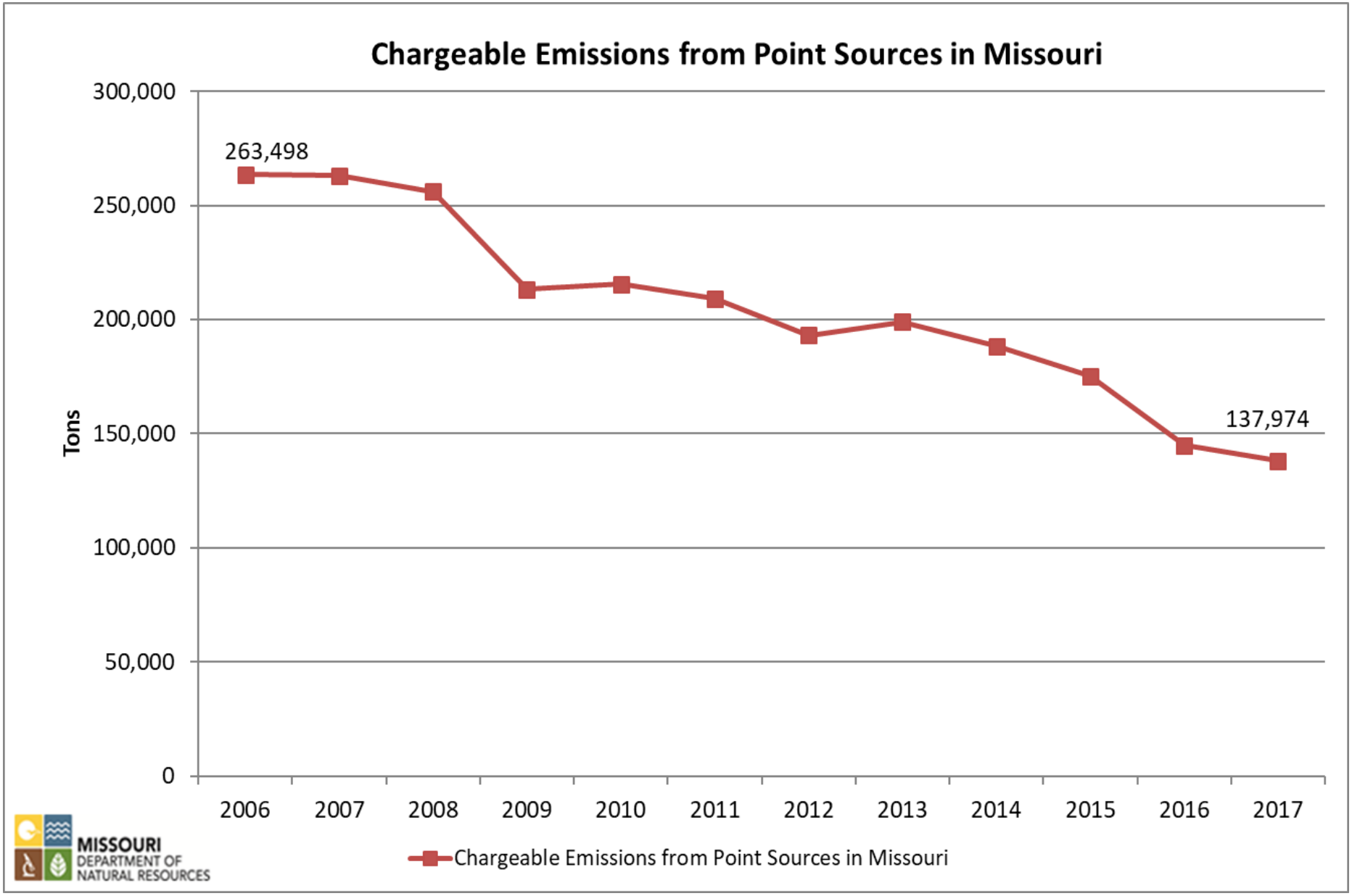
Chargeable Emissions from Point Sources in Missouri
300,000
250,000
200,000
150,000
100,000
50,000
0
Tons
263,498
137,974
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
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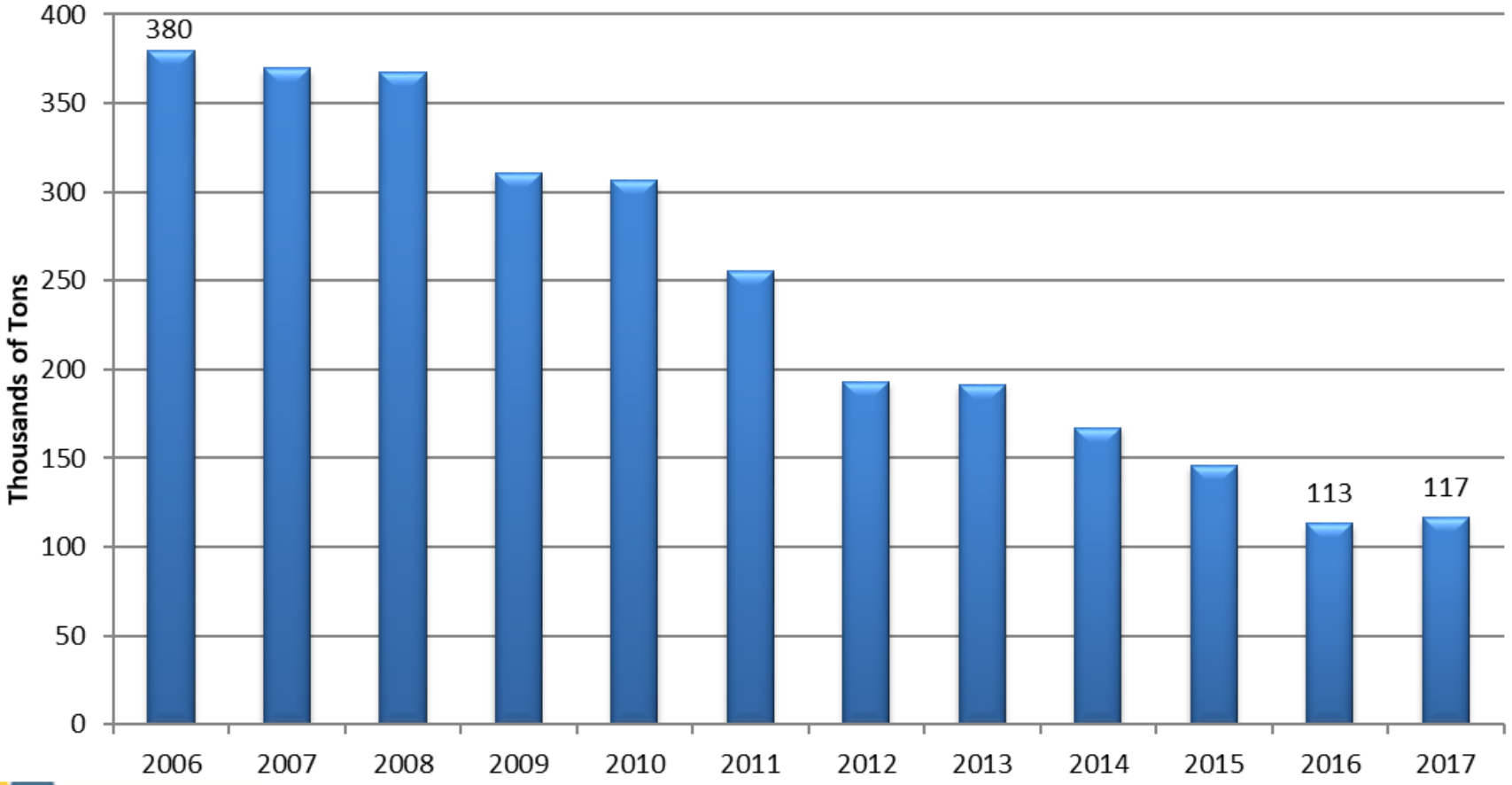
Chargeable Emissions from Point Sources in Missouri

Sulfur Dioxide (SO_2) Emissions from Point Sources in Missouri



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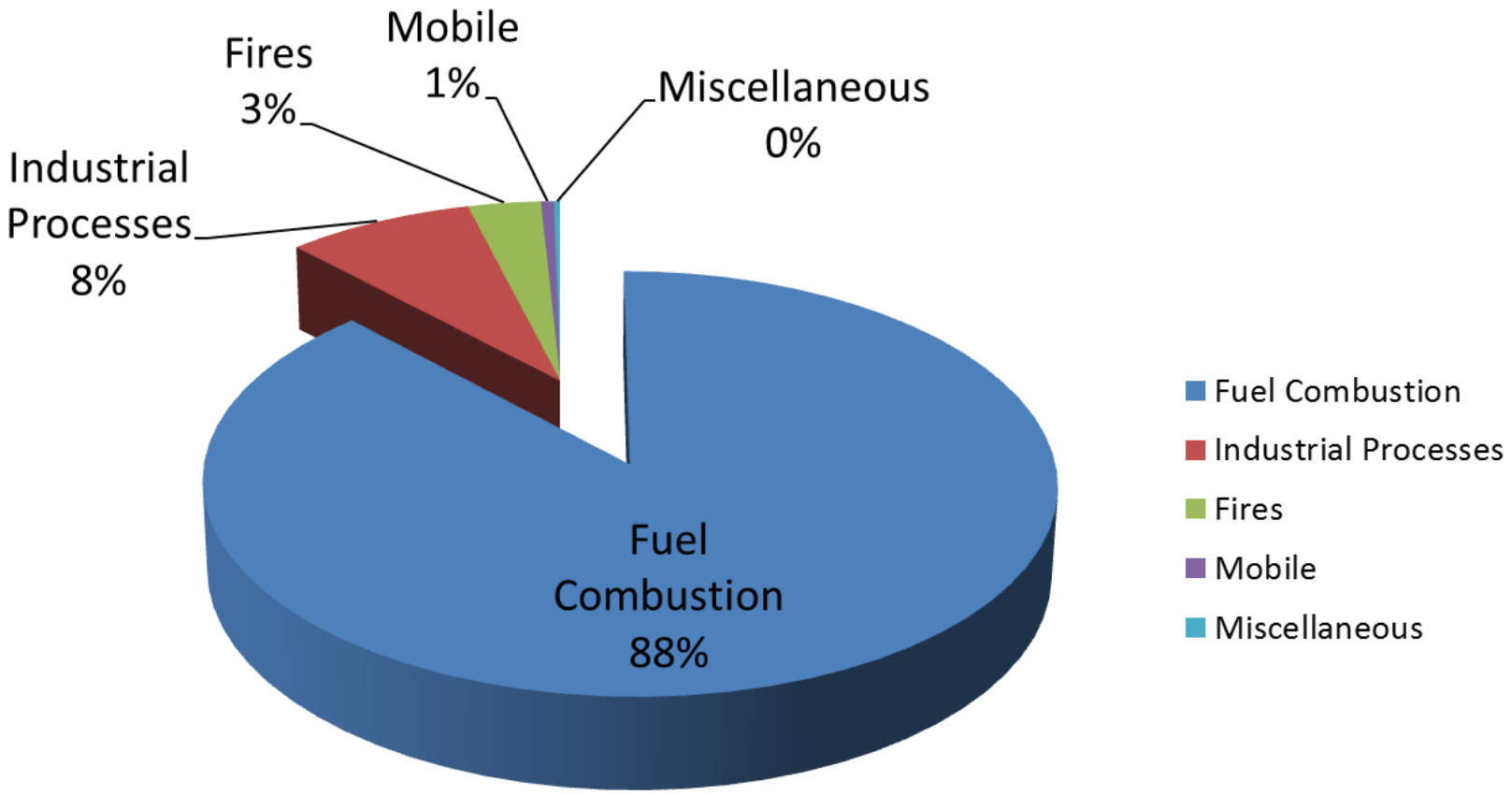
Total Sulfur Dioxide Emissions in Missouri
(2014 National Emissions Inventory Version 2)



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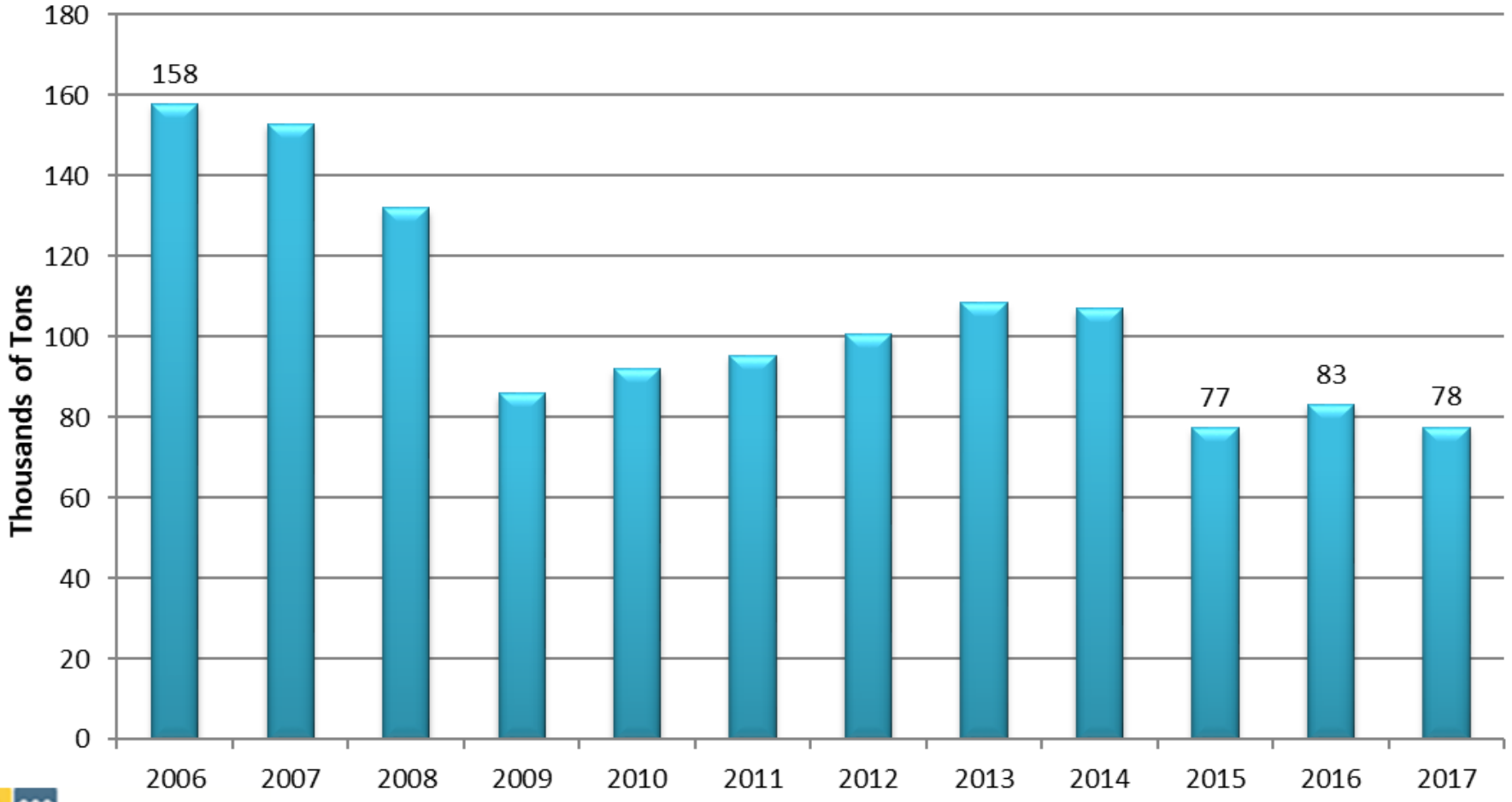
Data Source https://www.epa.gov/air-emissions-inventories/air-emissions-sources
(Percentages are rounded)

Nitrogen Oxides (NO_x) Emissions from Point Sources in Missouri



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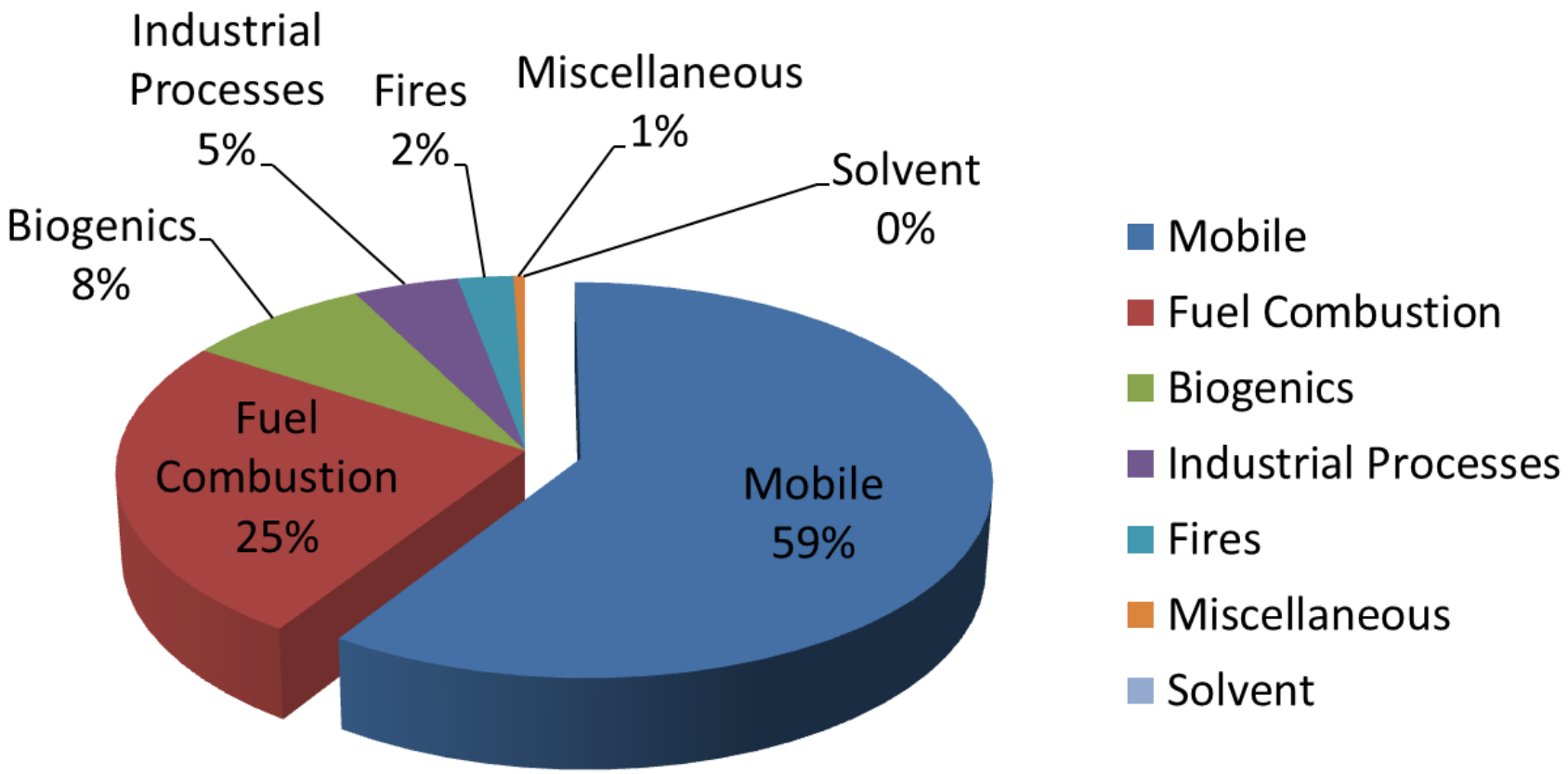
Total Nitrogen Oxides Emissions in Missouri (2014 National Emissions Inventory Version 2)



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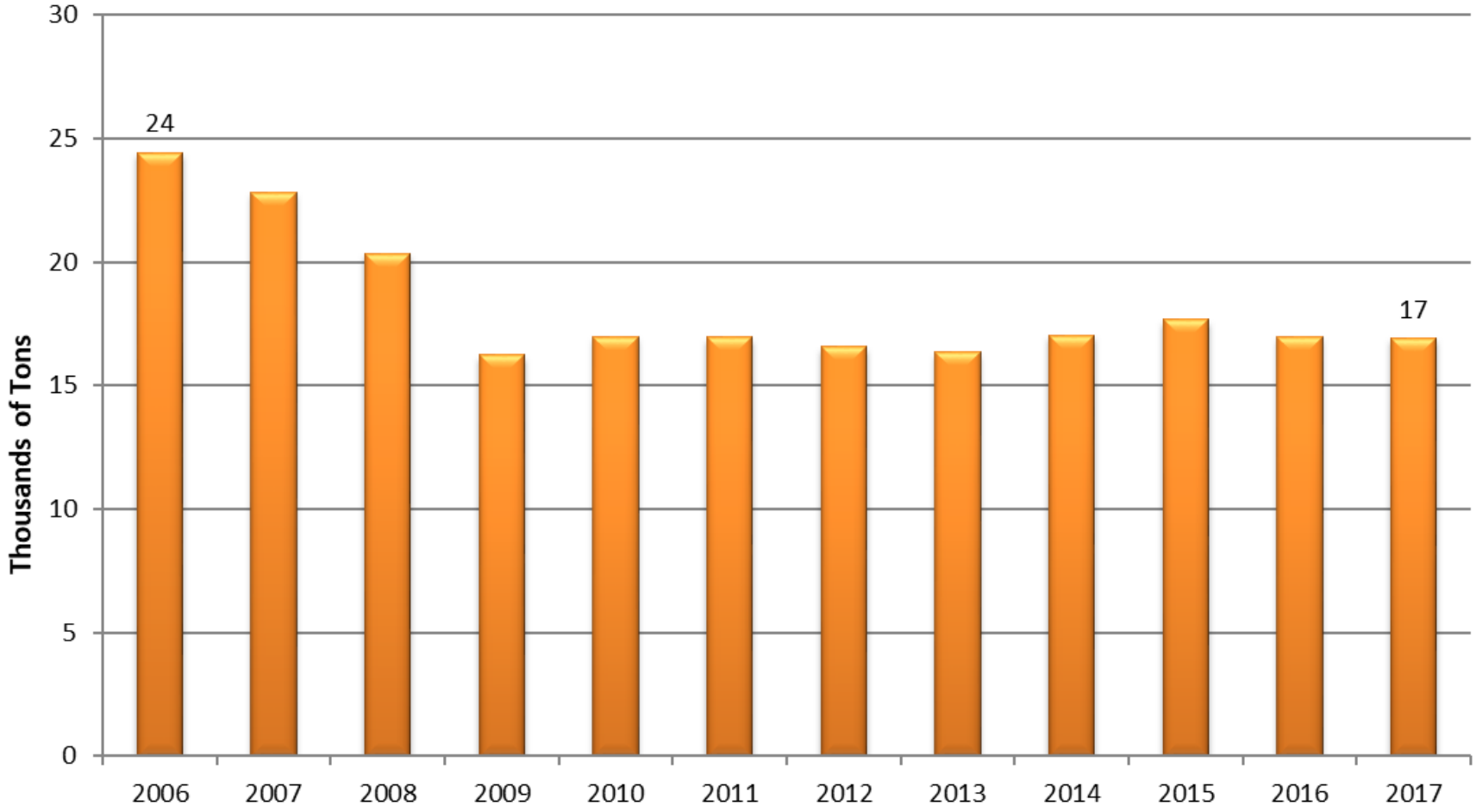
Data Source https://www.epa.gov/air-emissions-inventories/air-emissions-sources
(Percentages are rounded)

Volatile Organic Compounds
Emissions from Point Sources in Missouri



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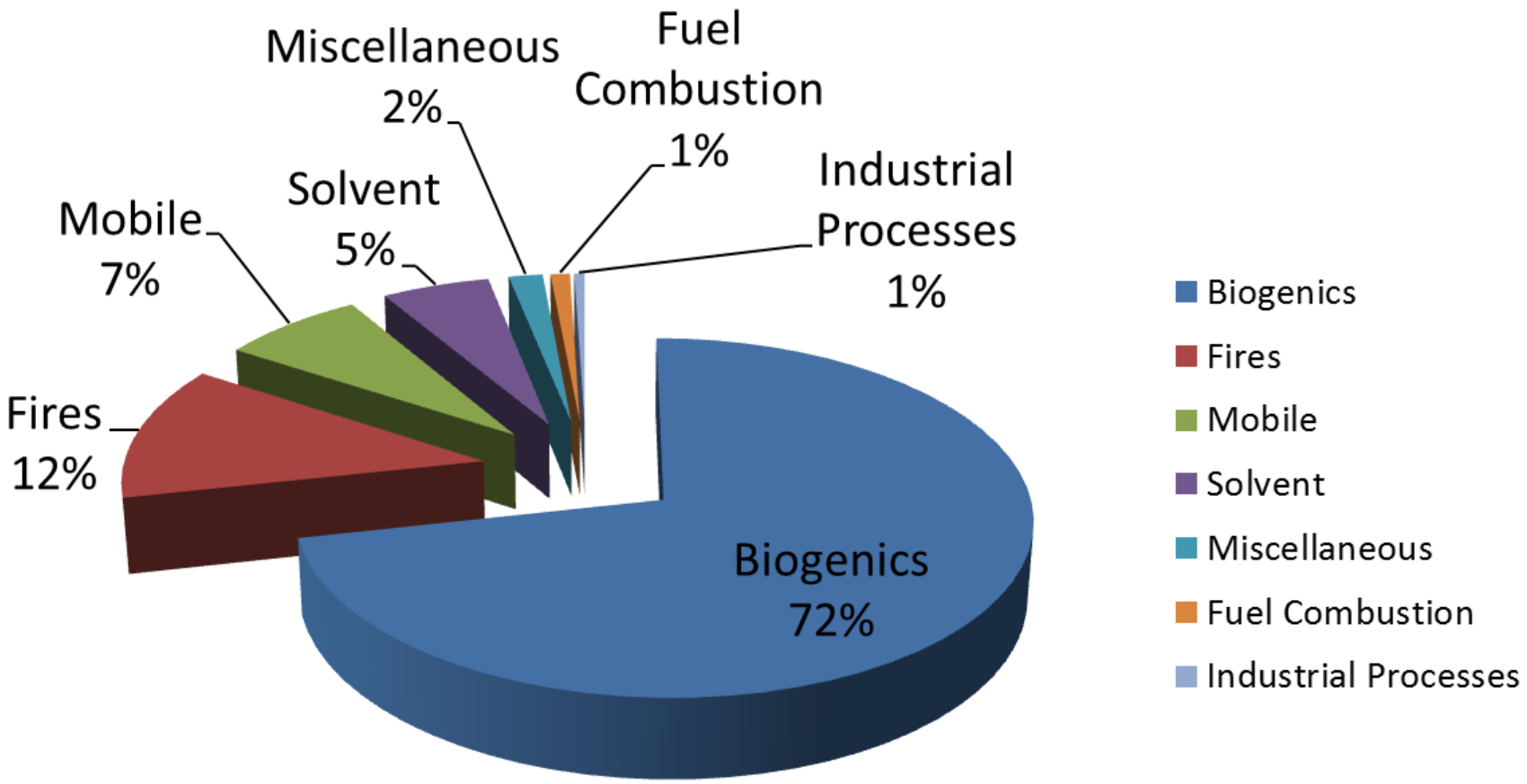
Total Volitile Organic Compounds Emissions in Missouri (2014 National Emissions Inventory Version 2)



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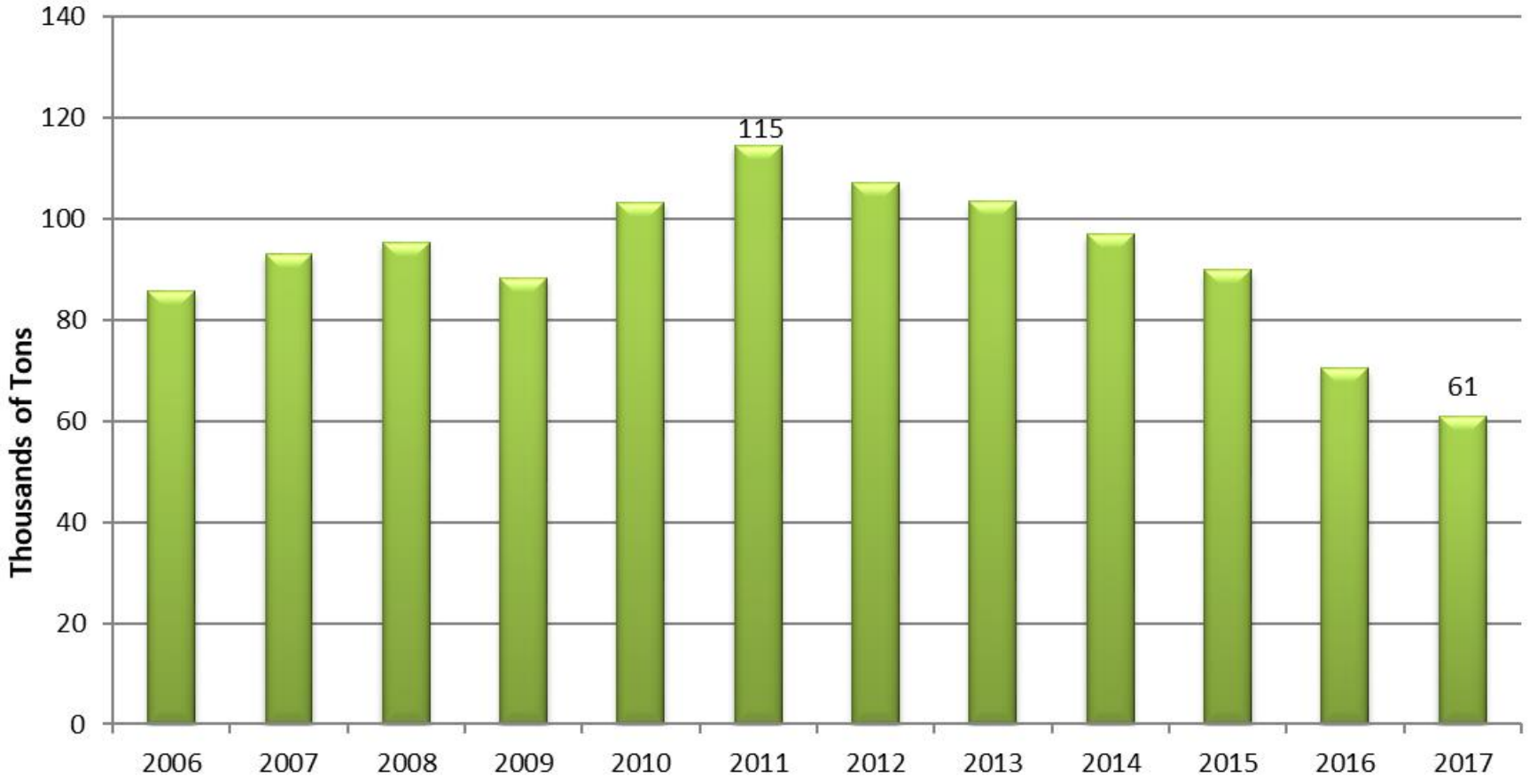
Data Source https://www.epa.gov/air-emissions-inventories/air-emissions-sources
(Percentages are rounded)

Carbon Monoxide (CO) Emissions from Point Sources in Missouri



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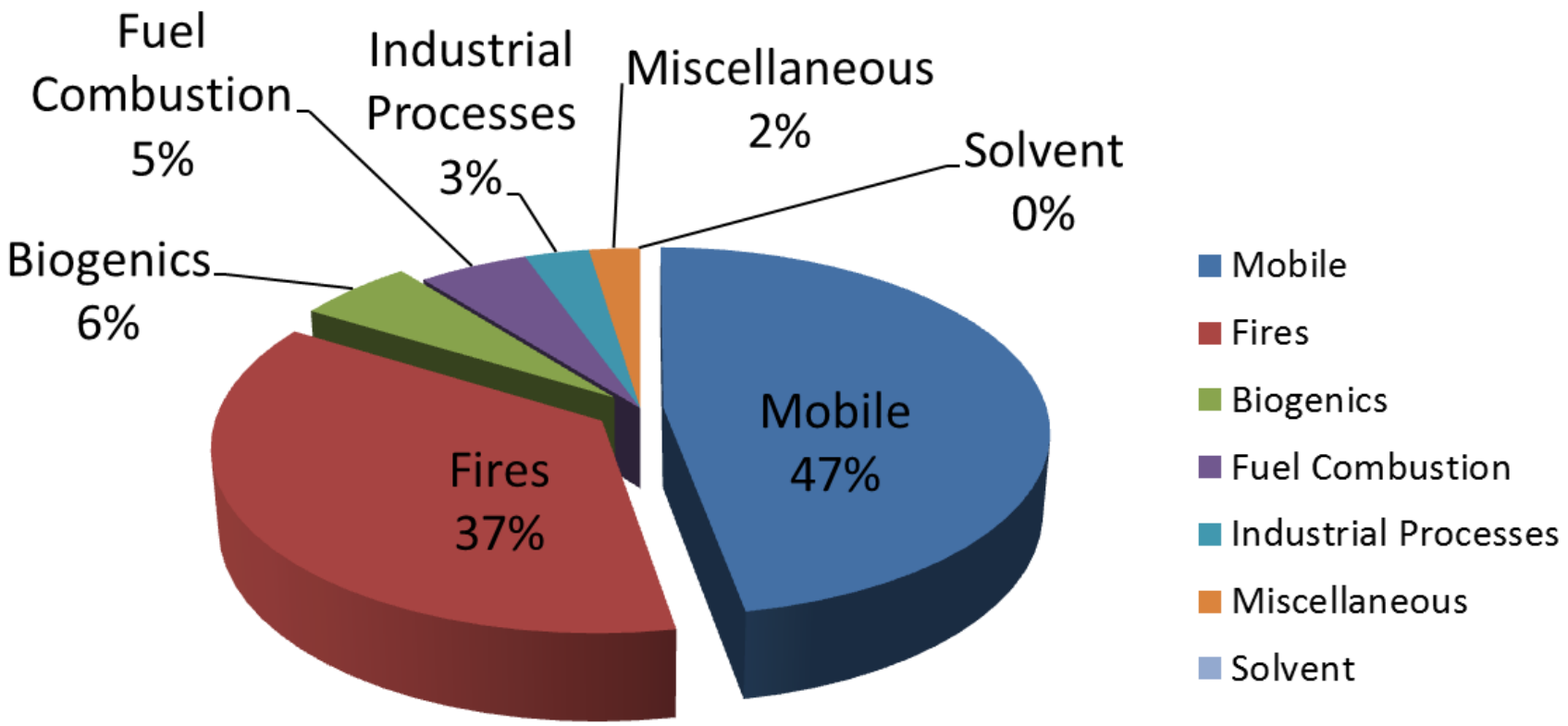
Total Carbon Monoxide Emissions in Missouri (2014 National Emissions Inventory Version 2)



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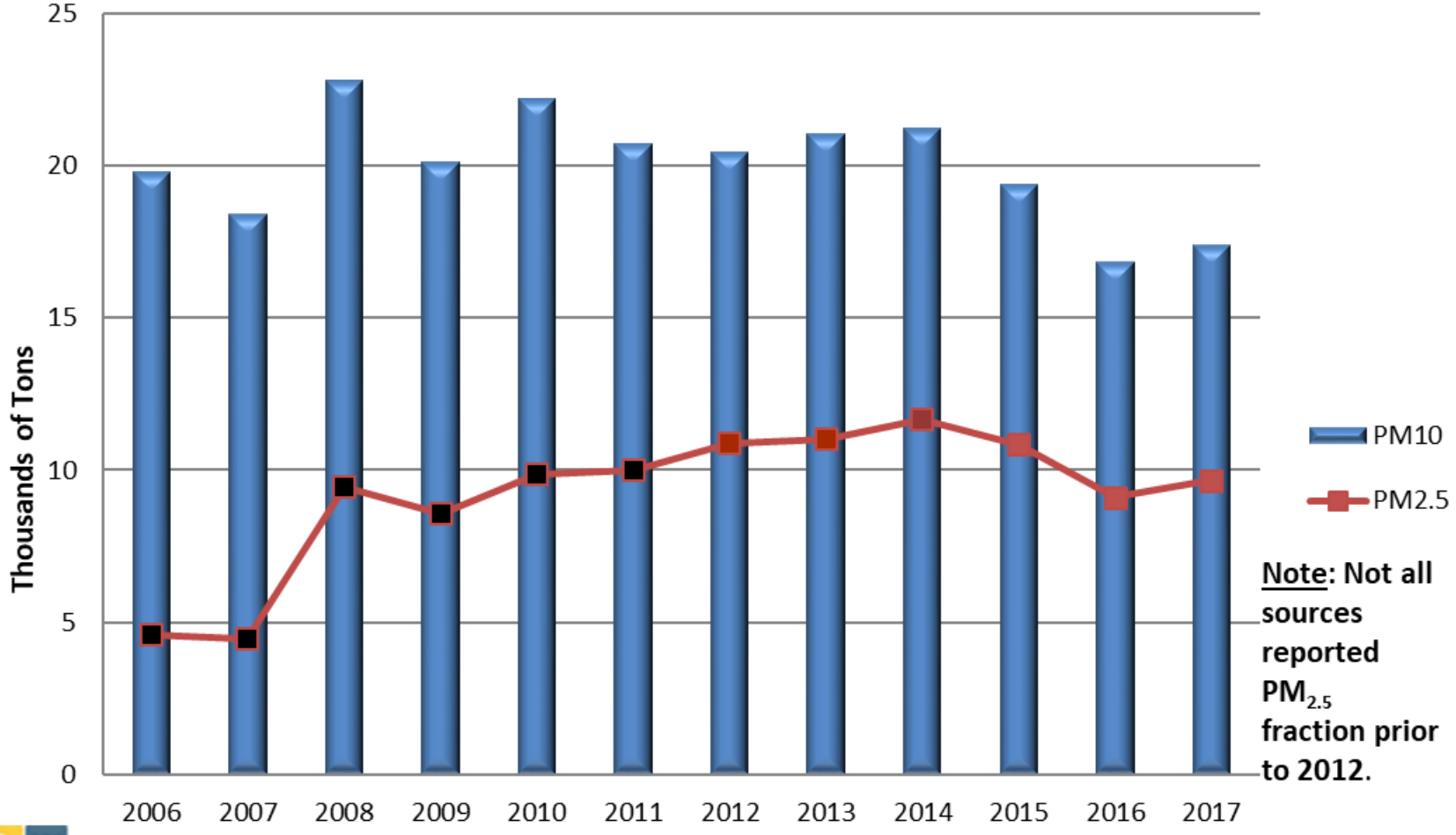
Data Source https://www.epa.gov/air-emissions-inventories/air-emissions-sources
(Percentages are rounded)

Particulate Matter (PM_{10}) Emissions from Point Sources in Missouri

(With $PM_{2.5}$ Fraction)



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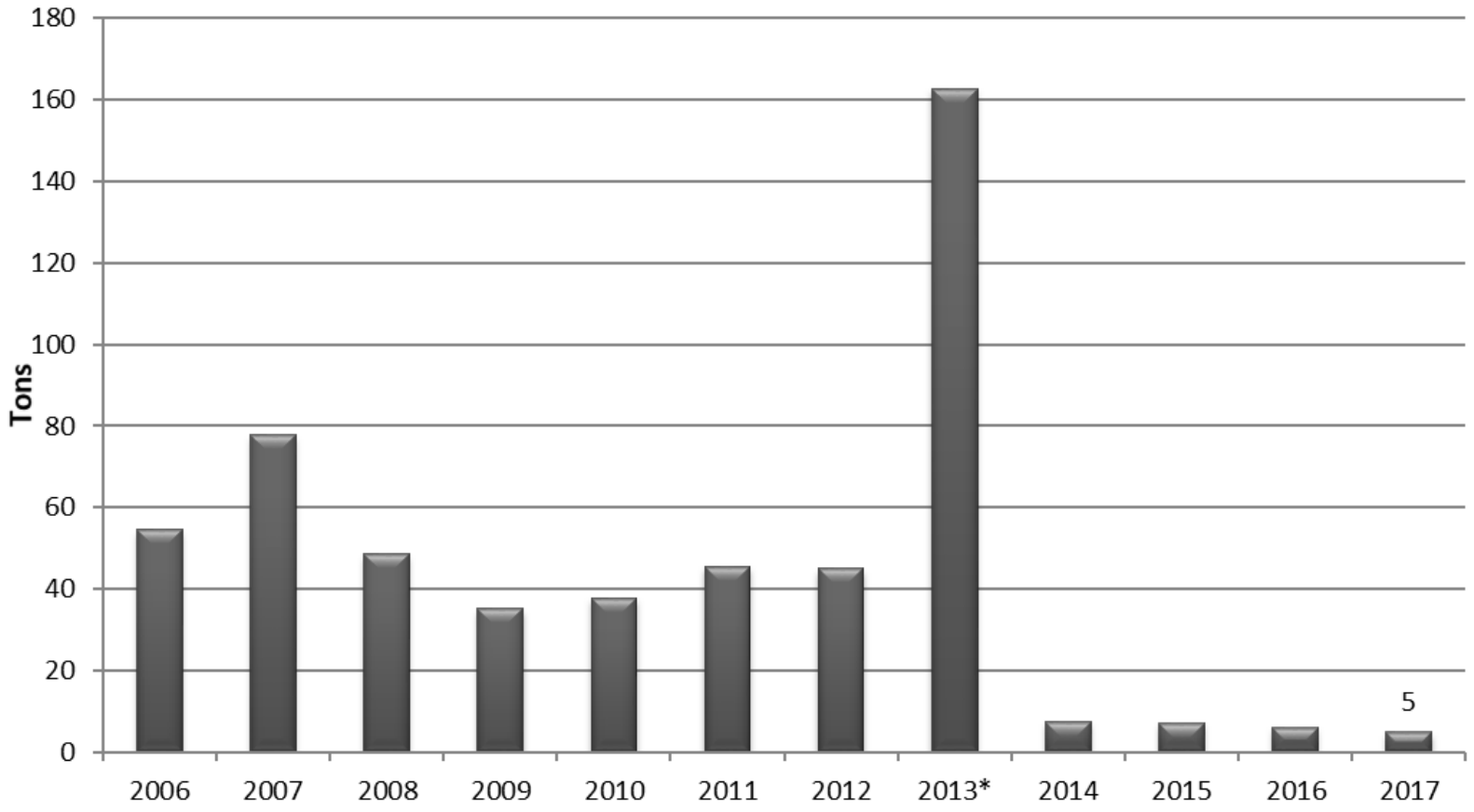
Airborne Lead Emissions from Point Sources in Missouri



* Increased lead emissions for 2013 is the result of stack testing at a single facility. The facility shut down the processes that release emissions through the tested stacks at the end of the 2013 emission year, and the increased emissions are the result of the shut down activities.

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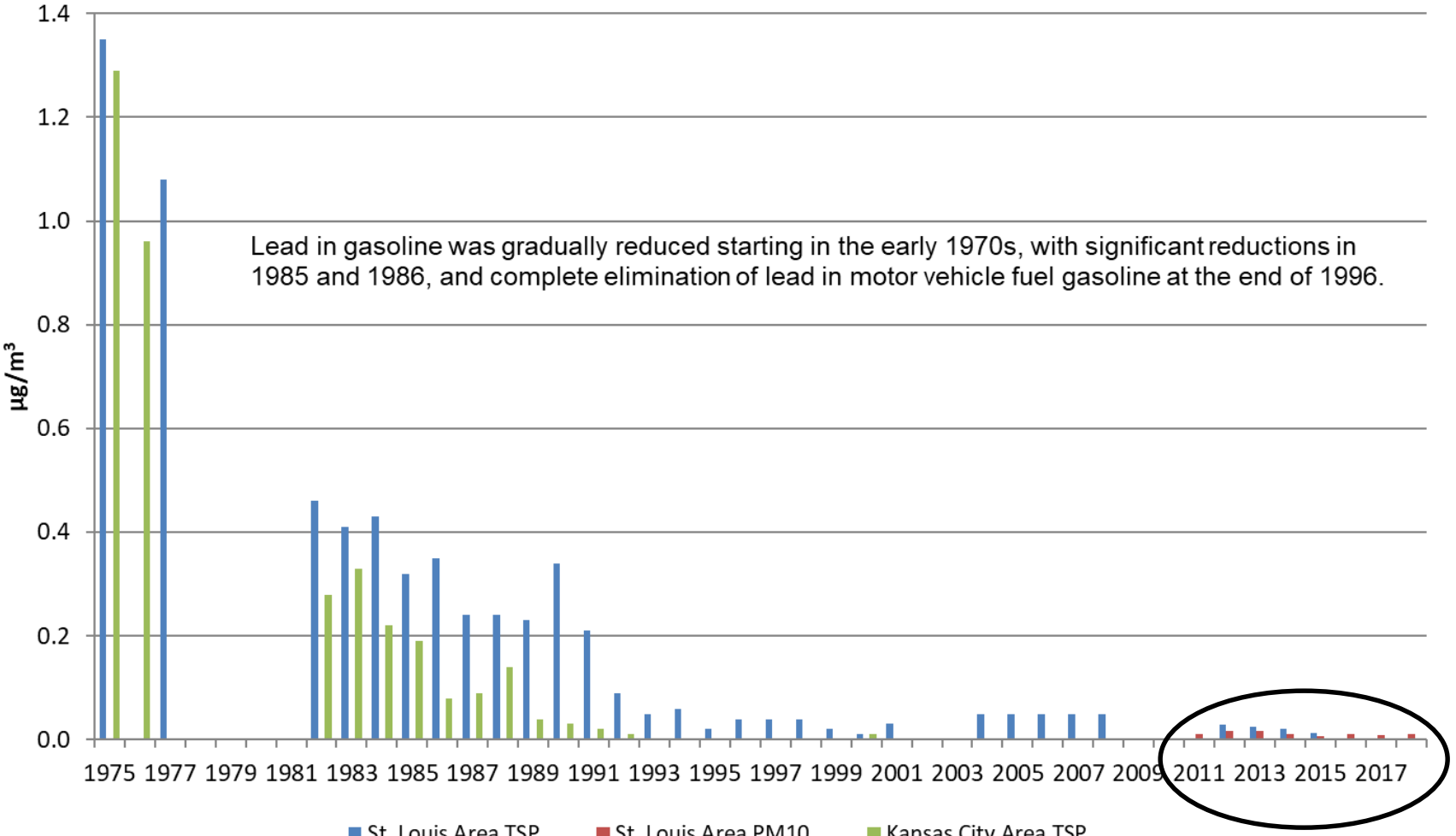
Highest Quarterly Average Lead Concentration in Area

(2011-2018, highest 3-month rolling average)



(not including Jefferson County)

No additional historical lead data were found in AQS from IL and KS sites in the St. L and KC areas.

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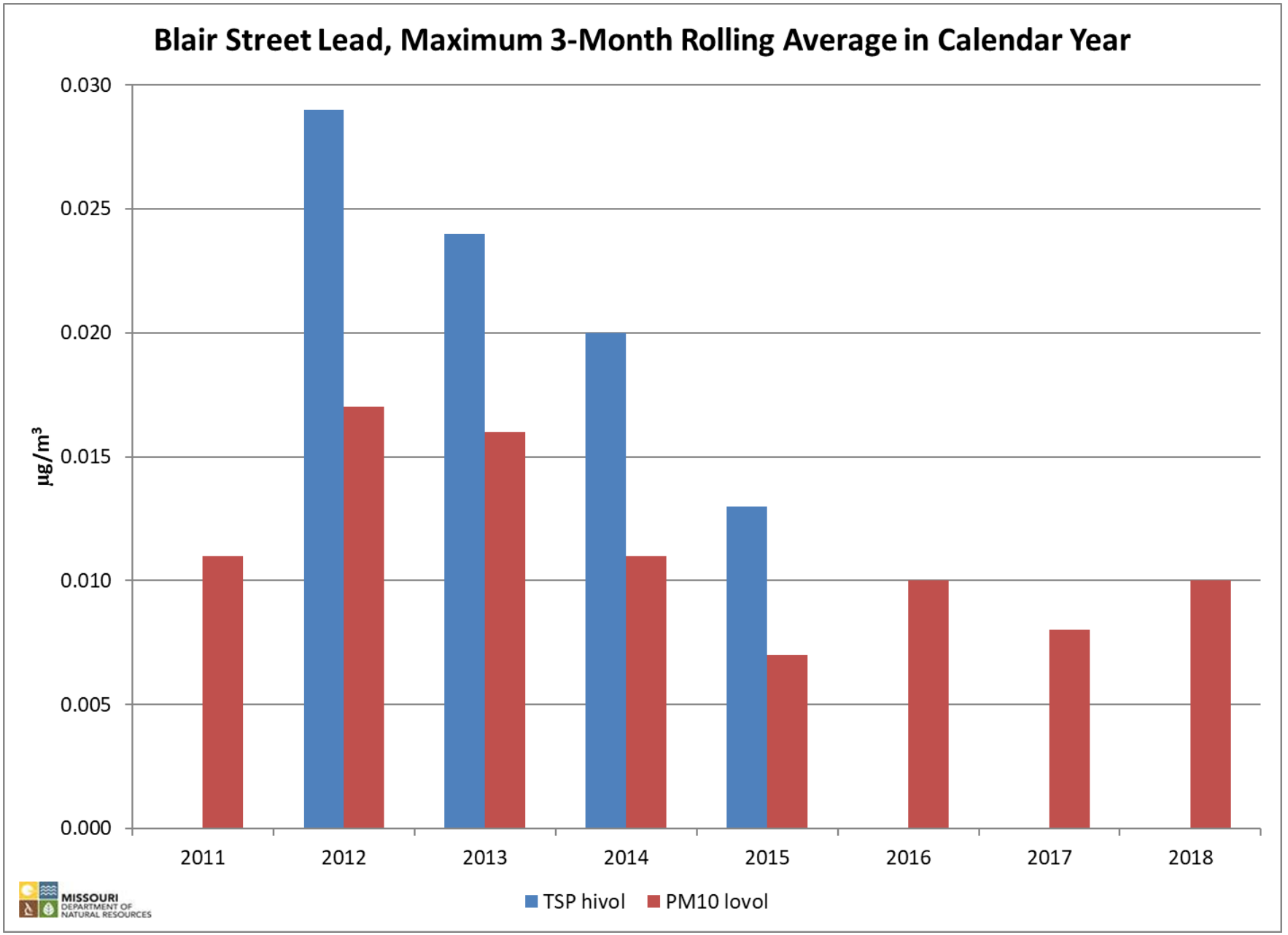
Blair Street Lead, Maximum 3-Month Rolling Average in Calendar Year
0.030
0.025
0.020
0.015
0.010
0.005
0.000
µg/m³
2011
2012
2013
2014
2015
2016
2017
2018
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TSP hivol
PM10 lovol

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Ambient Air Monitoring Trends

- Area wide criteria pollutant long term monitoring trends are decreasing.
- Some single source and area specific National Ambient Air Quality Standards violations are being addressed.

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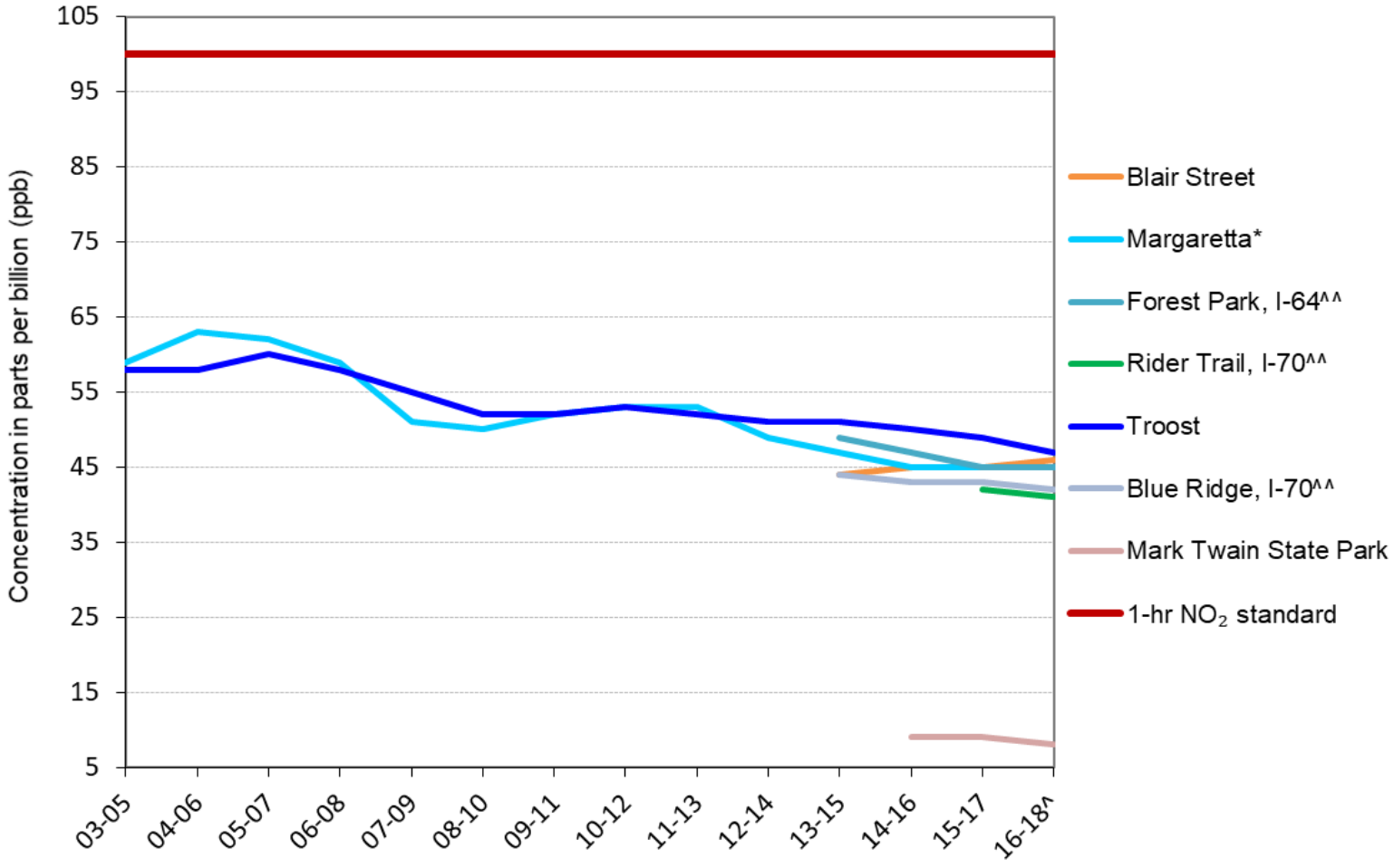
Monitoring Compliance

- NO_2: 1-hour (100 ppb) & annual (53 ppb) 2010 standard
- $PM_{2.5}$: Annual (12 µg/m^3) and 24-hour (35 µg/m^3) 2012 standards
- PM_{10}: 24-hour (150 µg/m^3) 1987 standard
- CO: 1-hour (35 ppm) or 8-hour (9 ppm)1971 standard

Missouri Trends in Nitrogen Dioxide (NO_2) Design Values, 2003-2018



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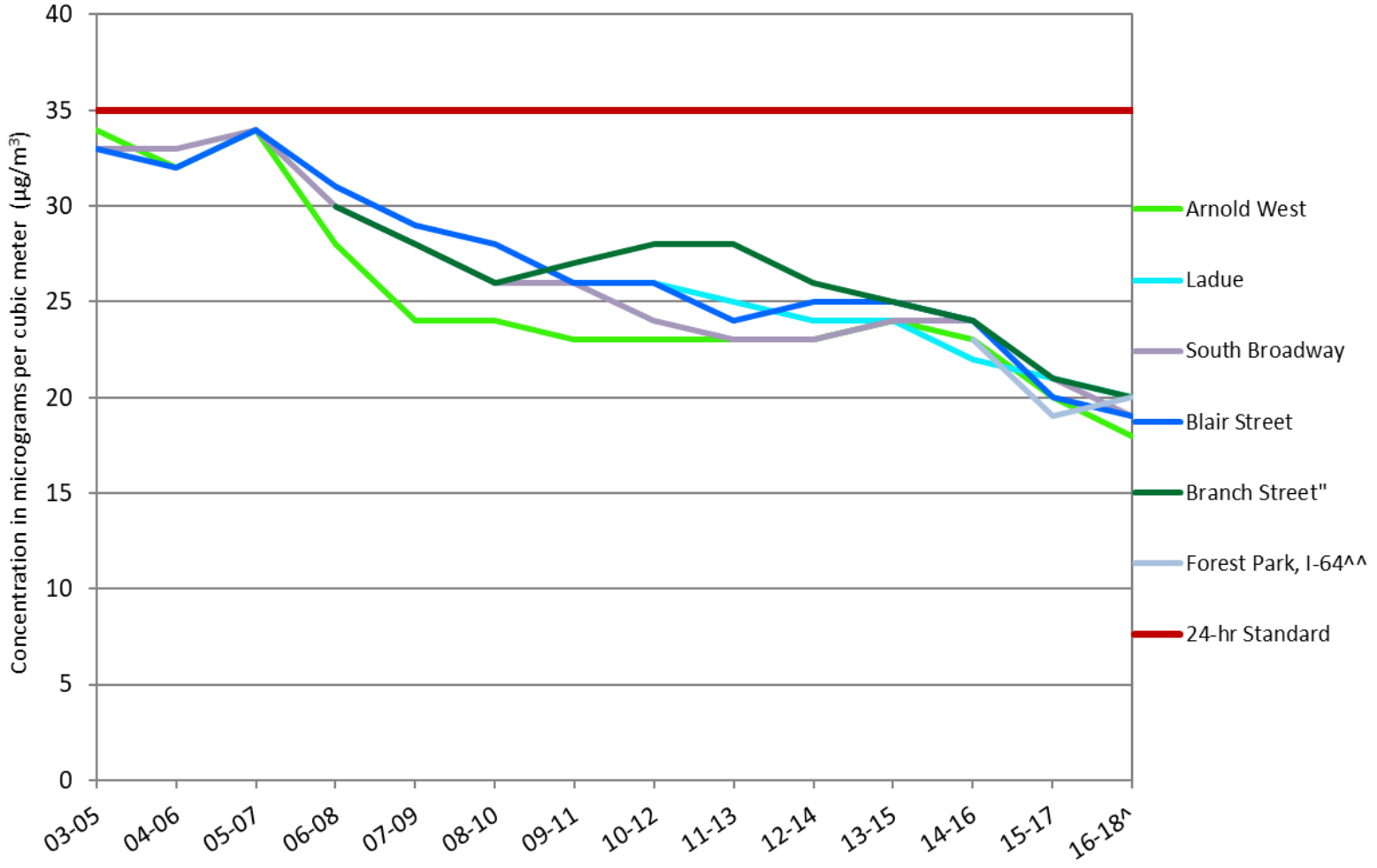
^Quality assured data through December 31, 2018

^^Near roadway monitor

*Margaretta was discontinued on 12/31/2018

St. Louis Area, Mo. Trends in $PM_{2.5}$ Design Values Based on 24-Hour Averages, 2003-2018



^Quality assured data through December 31, 2018.
^^Near roadway monitor
"Branch Street is a middle scale (100 meters to 0.5 kilometers) monitor and therefore cannot be compared to the standard.

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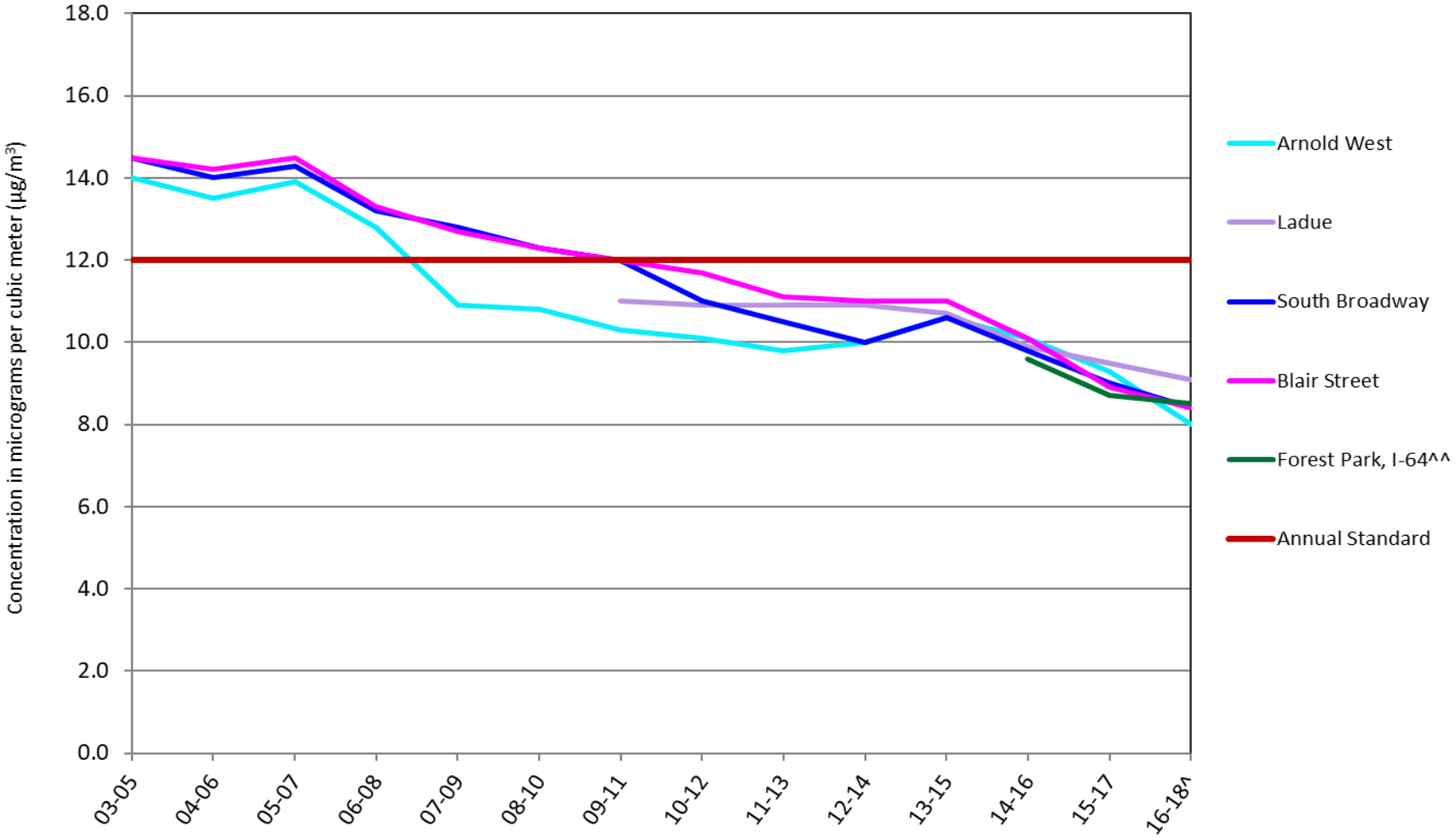
St. Louis, Area Mo. Trends in $PM_{2.5}$ Design Values Based on Annual Averages, 2003-2018



^Quality assured data through December 31, 2018.
^^Near roadway monitor
*The 2007-2009 design value for Arnold West is incomplete.

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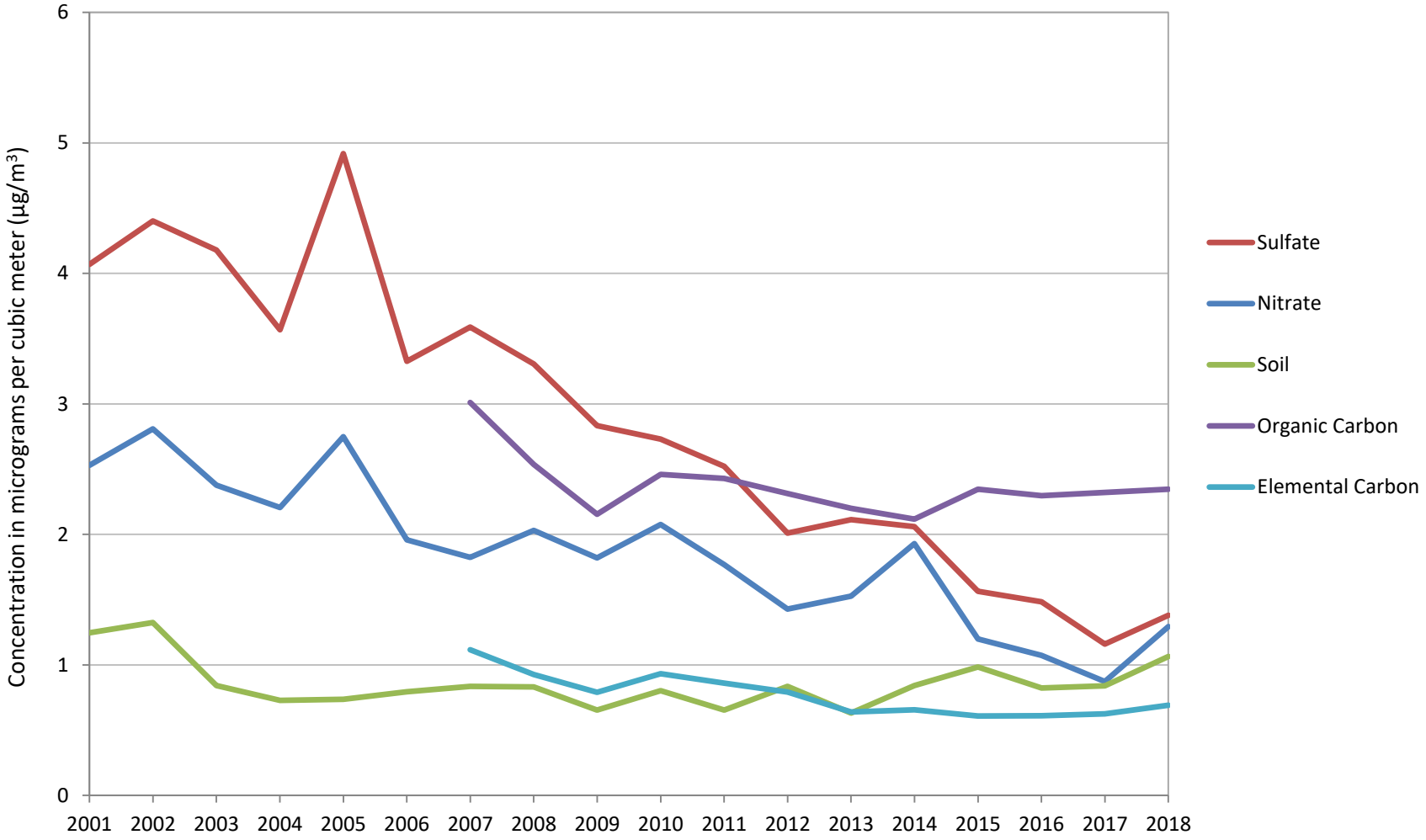
St. Louis (Mo) $PM_{2.5}$ Speciation Trends

Blair Street

Monitoring Data for all CSN Sampled Days



^Quality assured data through September 31, 2018.

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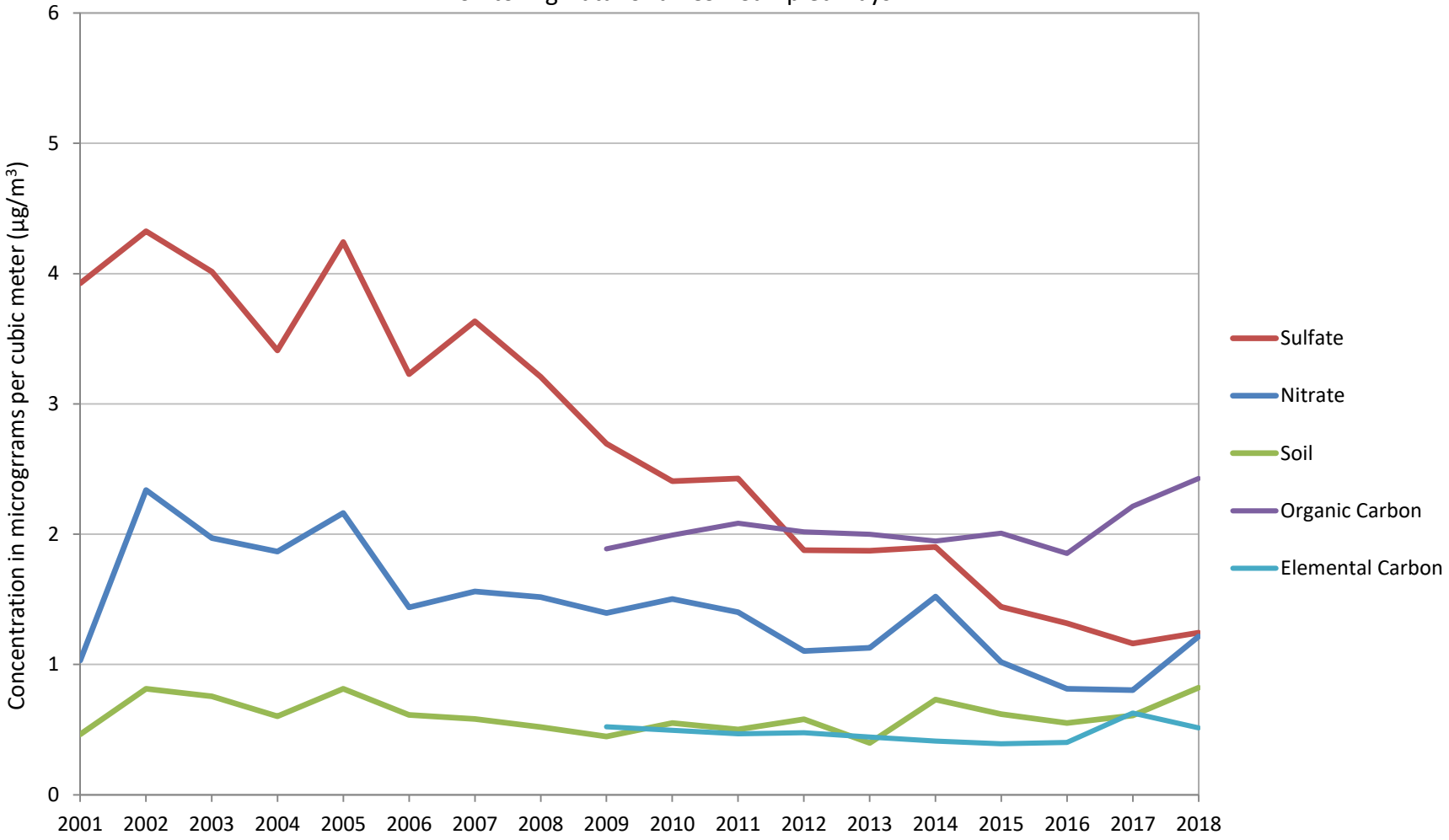
St. Louis (Mo) $PM_{2.5}$ Speciation Trends

Arnold West

Monitoring Data for all CSN Sampled Days



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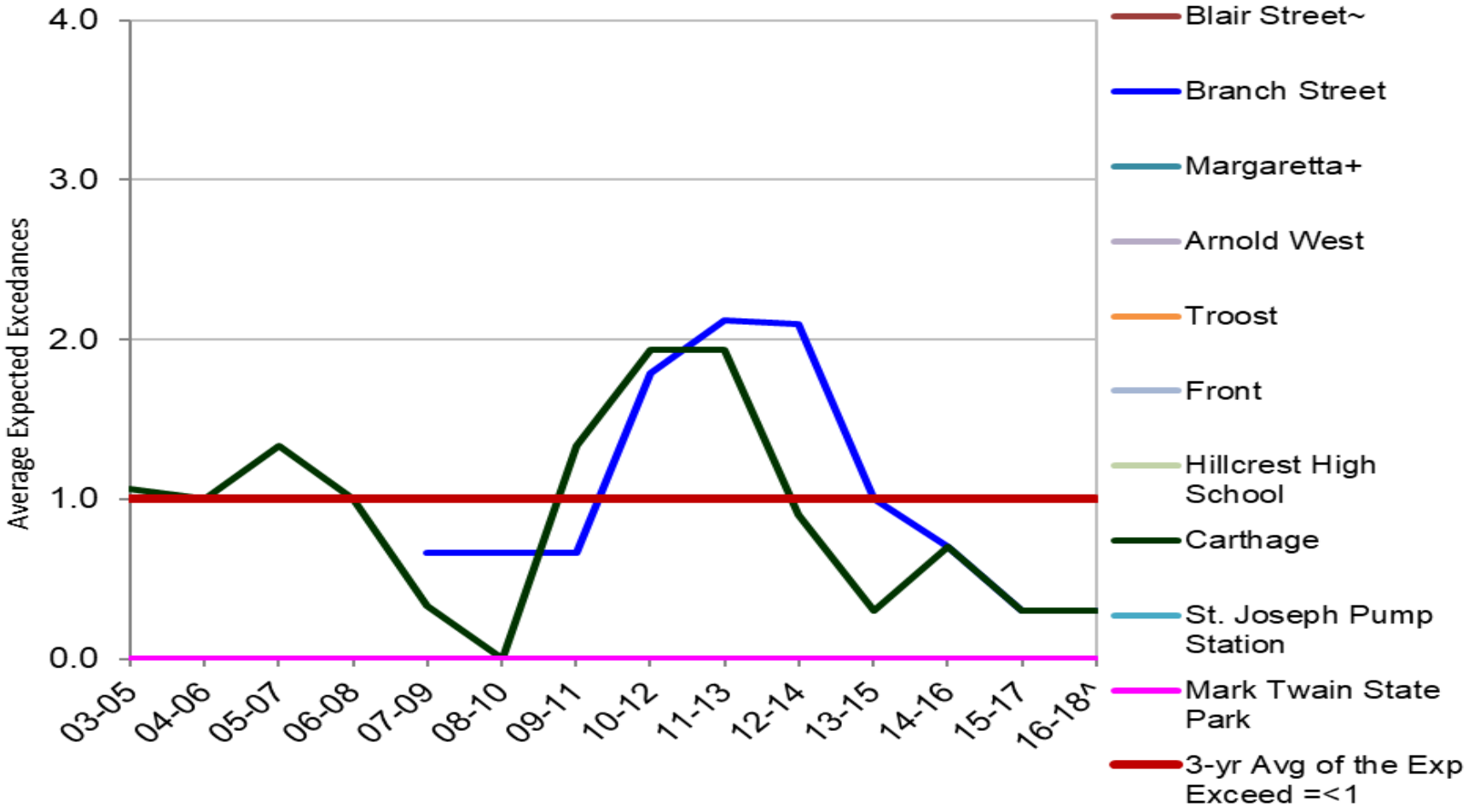
^Quality assured data through September 31, 2018

Trends of the 3-year Averages of the Expected Exceedance of the PM_{10} 24-hour Standard



^Quality assured data through December 31, 2018.
+Monitor has been discontinued as of 12/31/2018.

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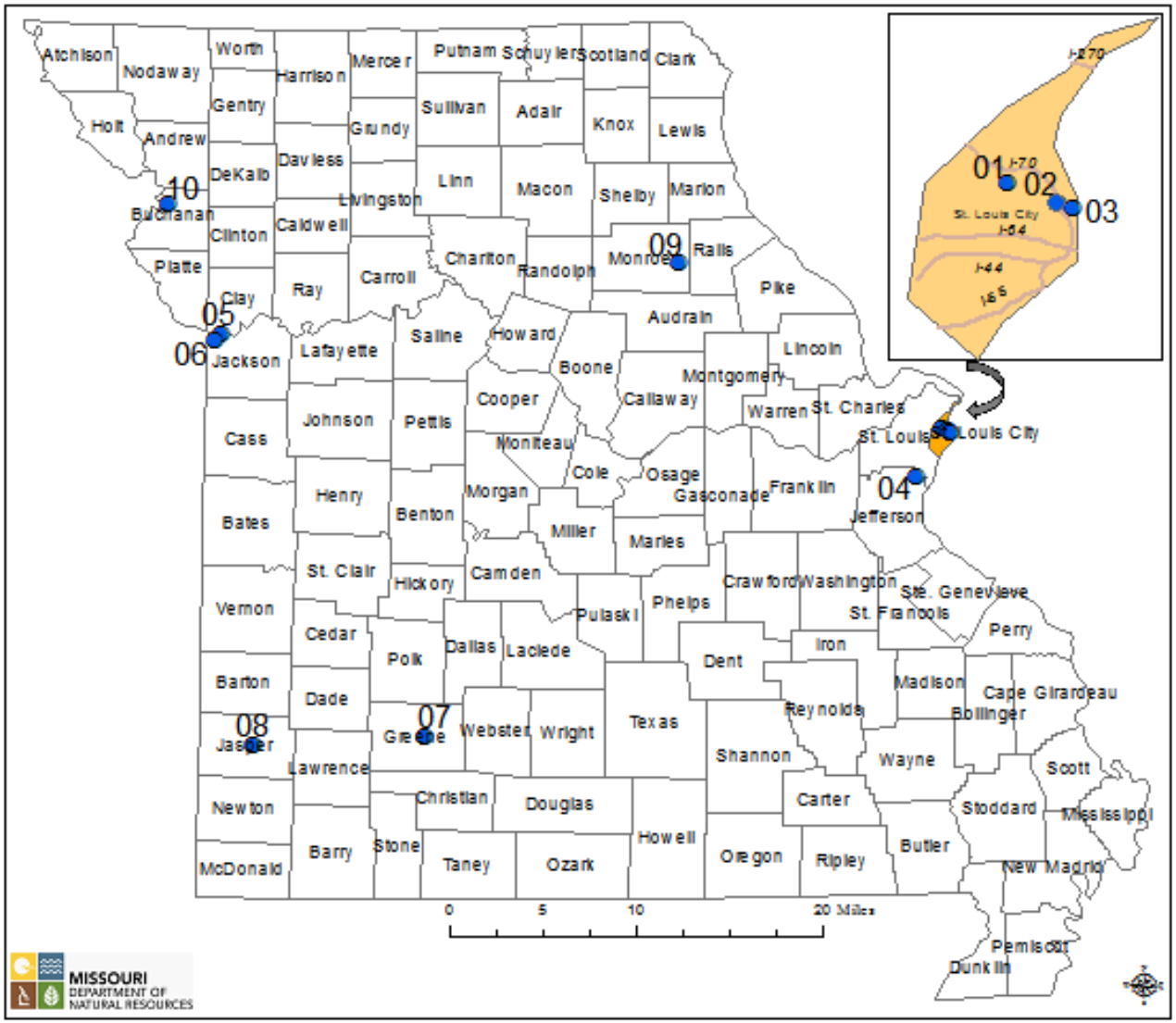
PM_{10} Monitoring Network, 2018



Number of Expected Exceedances^

St. Louis Area, MO

01 Margaretta+ (0.0)
02 Blair Street* (0.0)
03 Branch Street (0.3)
04 Arnold West (0.0)

Kansas City, MO

05 Front Street (0.0)
06 Troost (0.0)

Springfield Area, MO

07 Hillcrest High School (0.0)

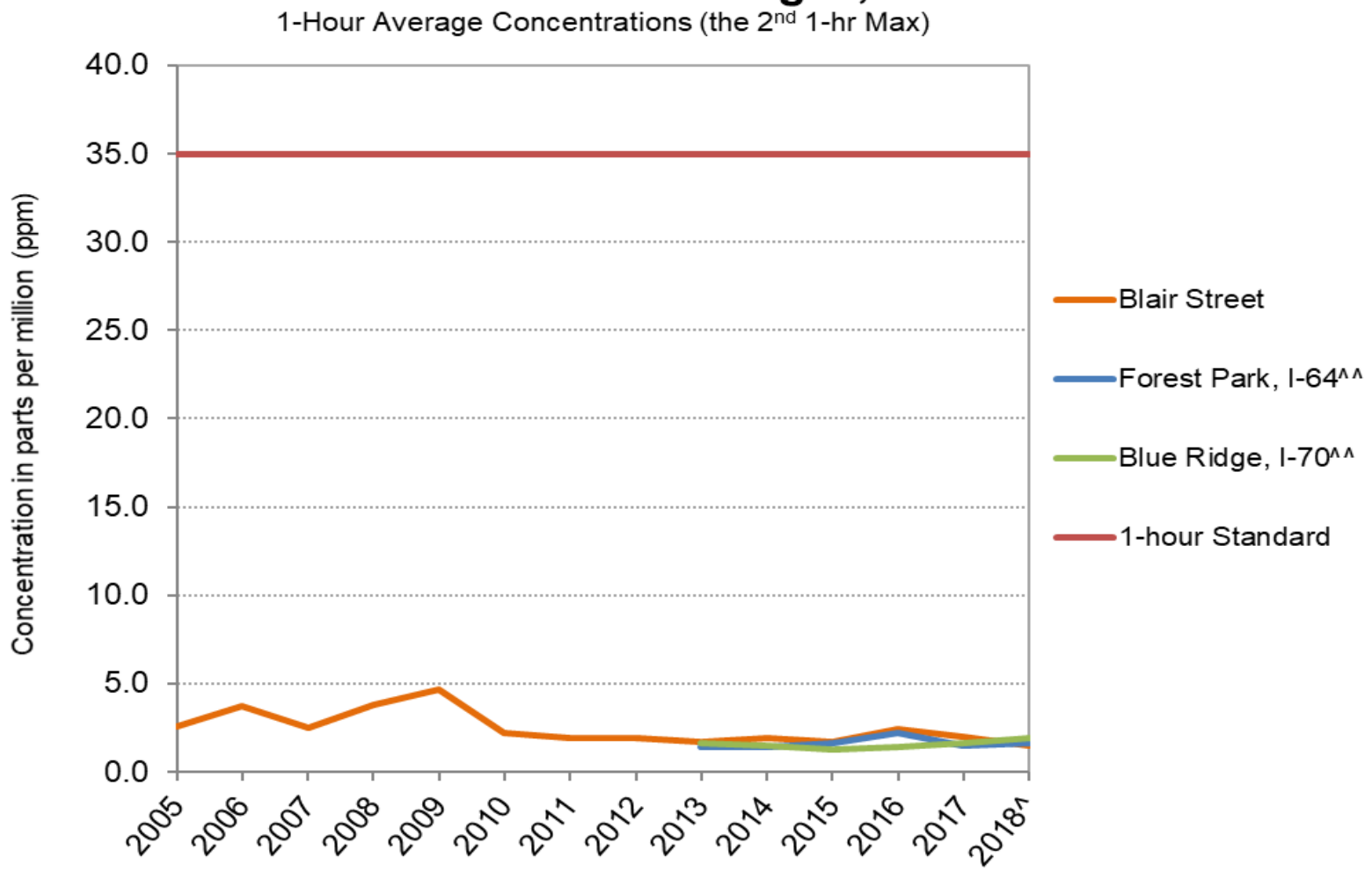
Outstate Area, MO

08 Carthage (0.3)
09 Mark Twain State Park (0.0)
10 St. Joseph Pump Station (0.0)

^Quality assured data through December 31, 2018
+Monitor has been discontinued as of 12/31/2018
**Filter based monitor*

The 24-hour standard is attained when the expected number of exceedances is less than or equal to one (1) when averaged over three (3) calendar years.

Missouri Trends in Carbon Monoxide (CO) Design Values Based on 1-Hour Averages, 2005-2018



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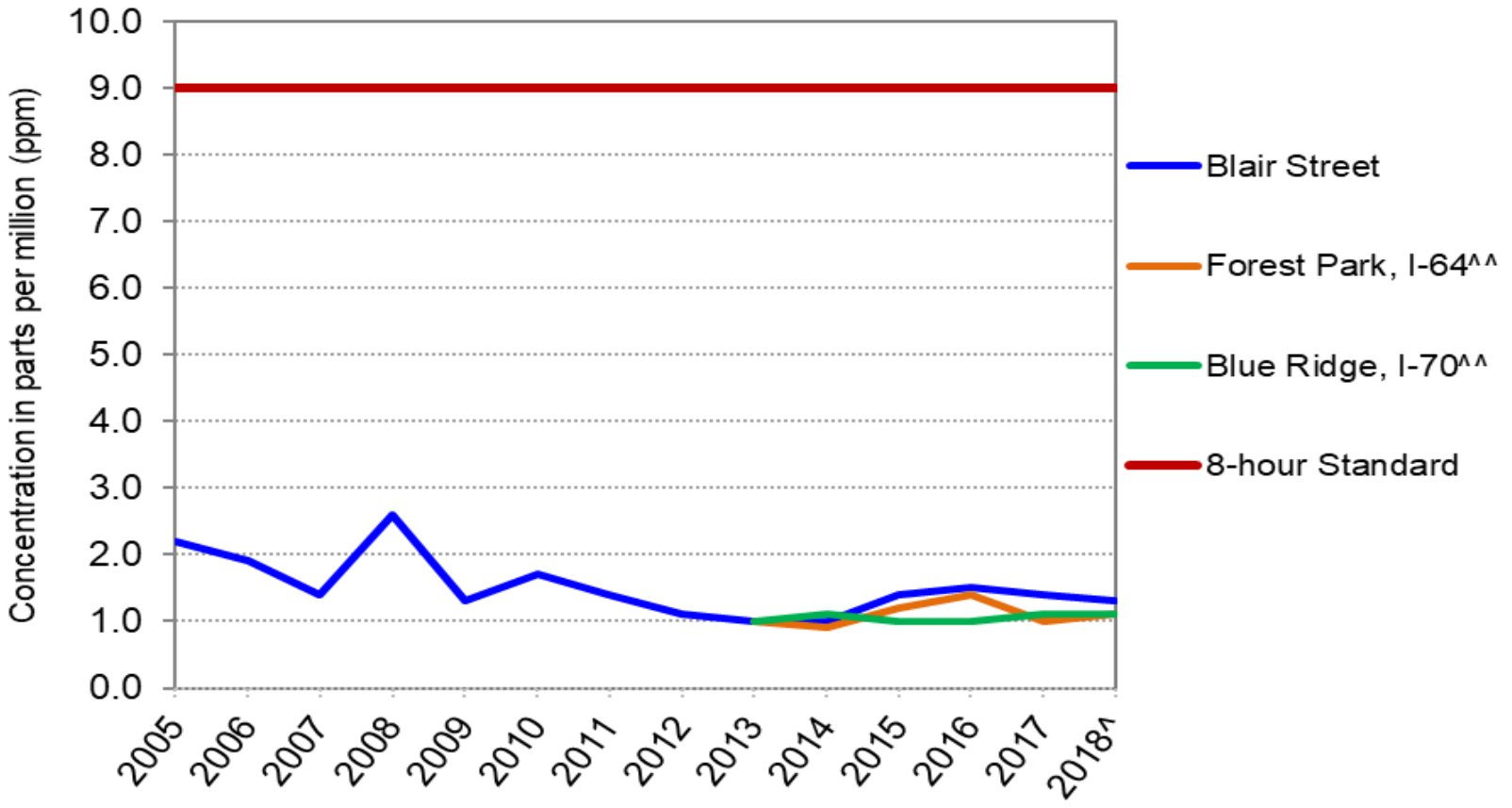
^Quality assured data through December 31, 2018.
^^Near roadway monitor

Missouri Trends for Carbon Monoxide (CO) Design Values Based on 8-hour Averages, 2005-2018

8-hour Average Concentrations (the second 8-hour Max)



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^Quality assured data through December 31, 2018.
^^Near roadway monitor

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Areas Not Monitoring Compliance

- **Ozone**: 8-hour (70 ppb) 2015 standard
  - One Area, St. Louis, 3 monitors

- **SO_2**: 1-hour (75 ppb) 2010 standard (One area anticipated)

- **Lead**: 3-month avg. (0.15 µg/m^3) 2010 standard
  - Two Areas
    Buick: No new violation since August 2016
    Herculaneum: Violation in 2017 due to non-recurring smelter demolition activity

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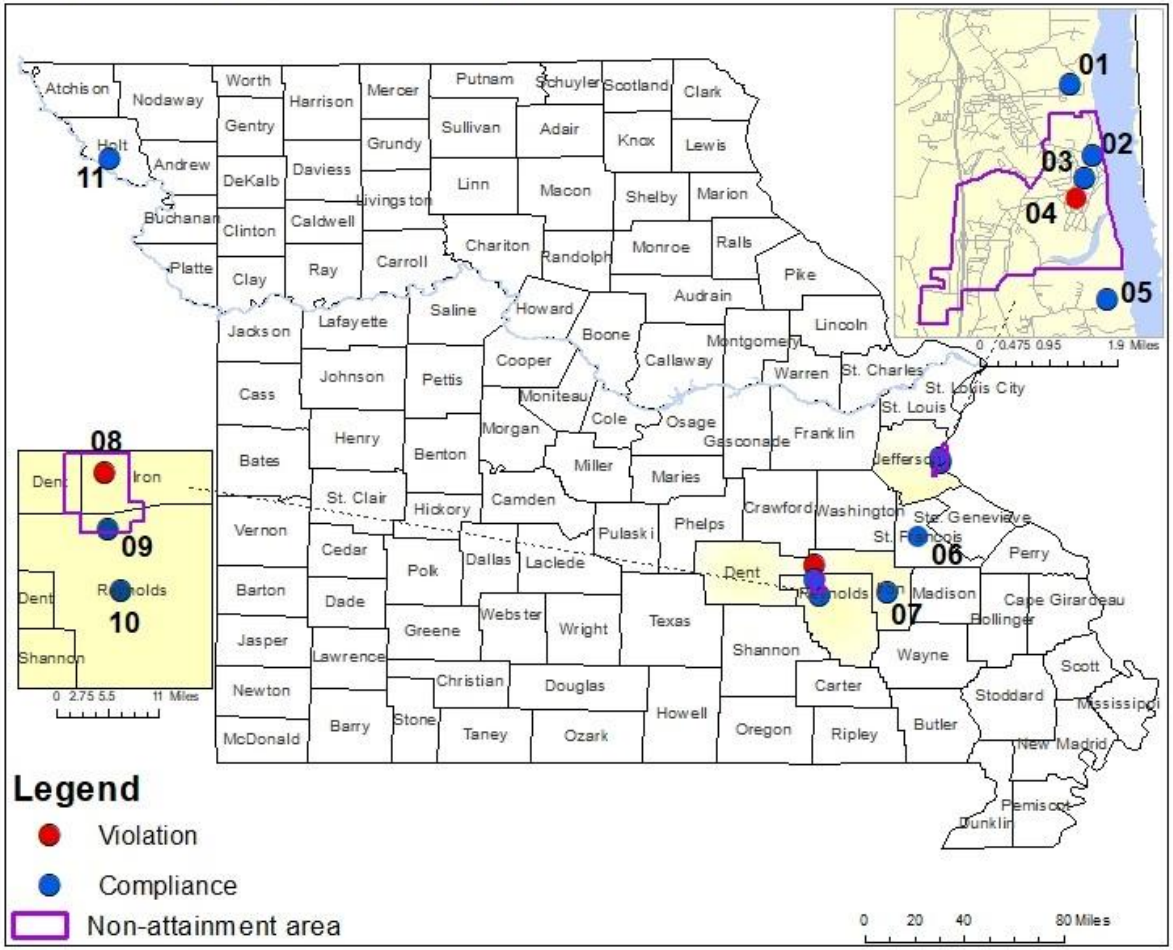
Missouri Statewide Lead (Pb) Monitoring Network, 2018

Rolling 3-Month Average NAAQS = 0.15 ug/m^3



2016-2018 Design Values (µg/m³)^

Herculaneum Area

- 01 Pevely* (0.02)
- 02 Herculaneum, Sherman (0.05)
- 03 Herculaneum, Dunklin High School (0.11)
- 04 Herculaneum, Mott St. **(0.21)**
- 05 Ursuline North (0.01)

Old Pb Belt Area

- 06 St. Joe State Park (0.03)

New Pb Belt Area

- 07 Glover (0.07)
- 08 Buick NE **(0.19)**
- 09 Oates (0.04)
- 10 Fletcher (0.05)

Outstate Area

- 11 Forest City, Exide Levee (0.02)

^Quality assured data through December 31, 2018

*Monitor has been discontinued

Red and bold is violation of the standard

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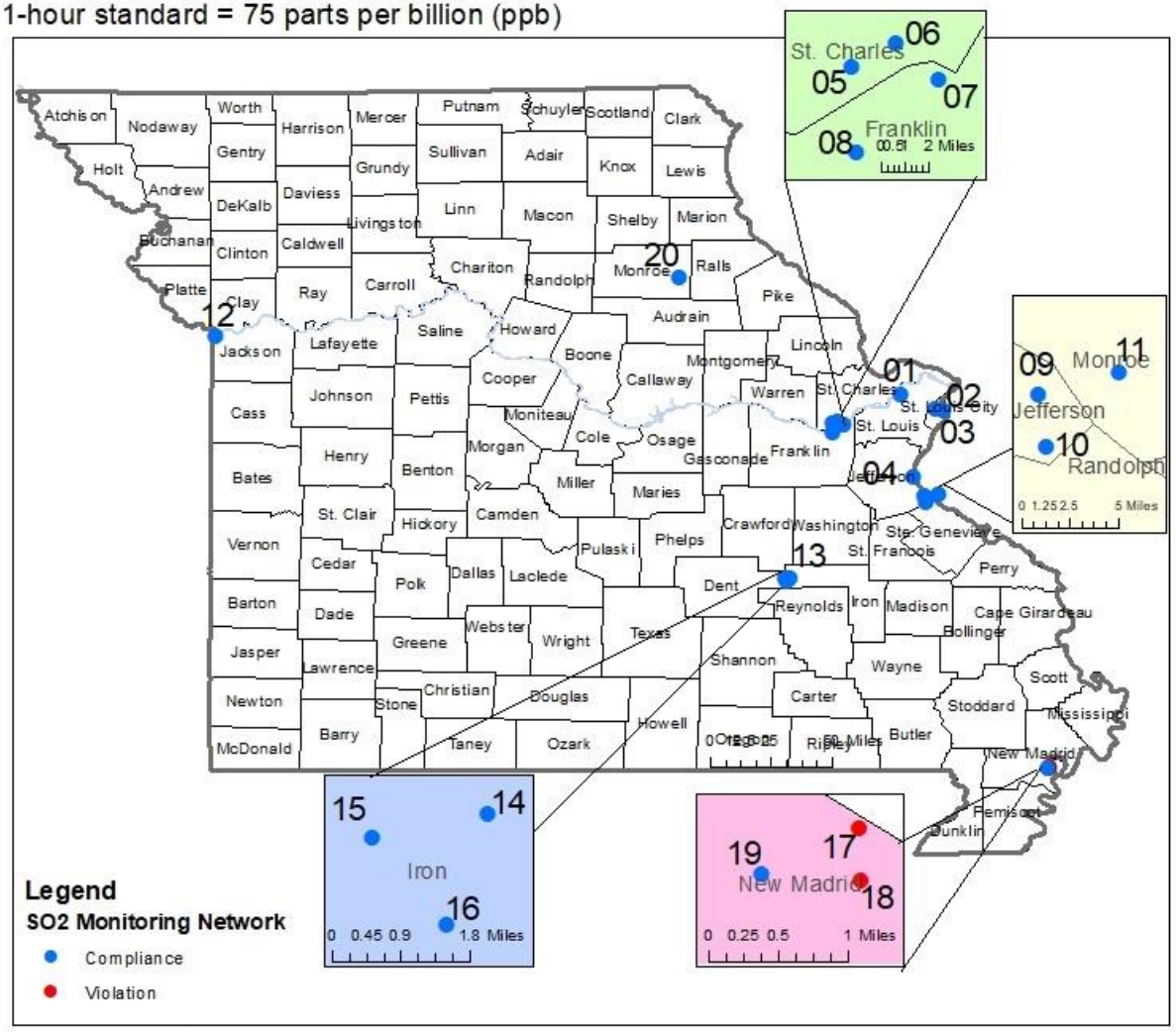
Statewide Sulfur Dioxide (SO2) Monitoring Network, 2018

1-hour standard = 75 parts per billion (ppb)



2016-2018 Design Values (ppb)^

St. Louis Area, MO

01 Rider Trail, I-70"~ (14)
02 Margaretta+ (12)
03 Blair Street (10)
04 Herculaneum, Mott Street (14)
05 Ameren-Northwest* (22)
06 Ameren-North*~(26)
07 Ameren-Valley* (28)
08 Ameren-Southwest*~ (21)
09 Ameren-Weaver & Hwy AA* (25)
10 Ameren-Natchez* (21)
11 Ameren-Fults, IL*~ (21)

Kansas City Area, MO

12 Troost (11)

Outstate Area, MO

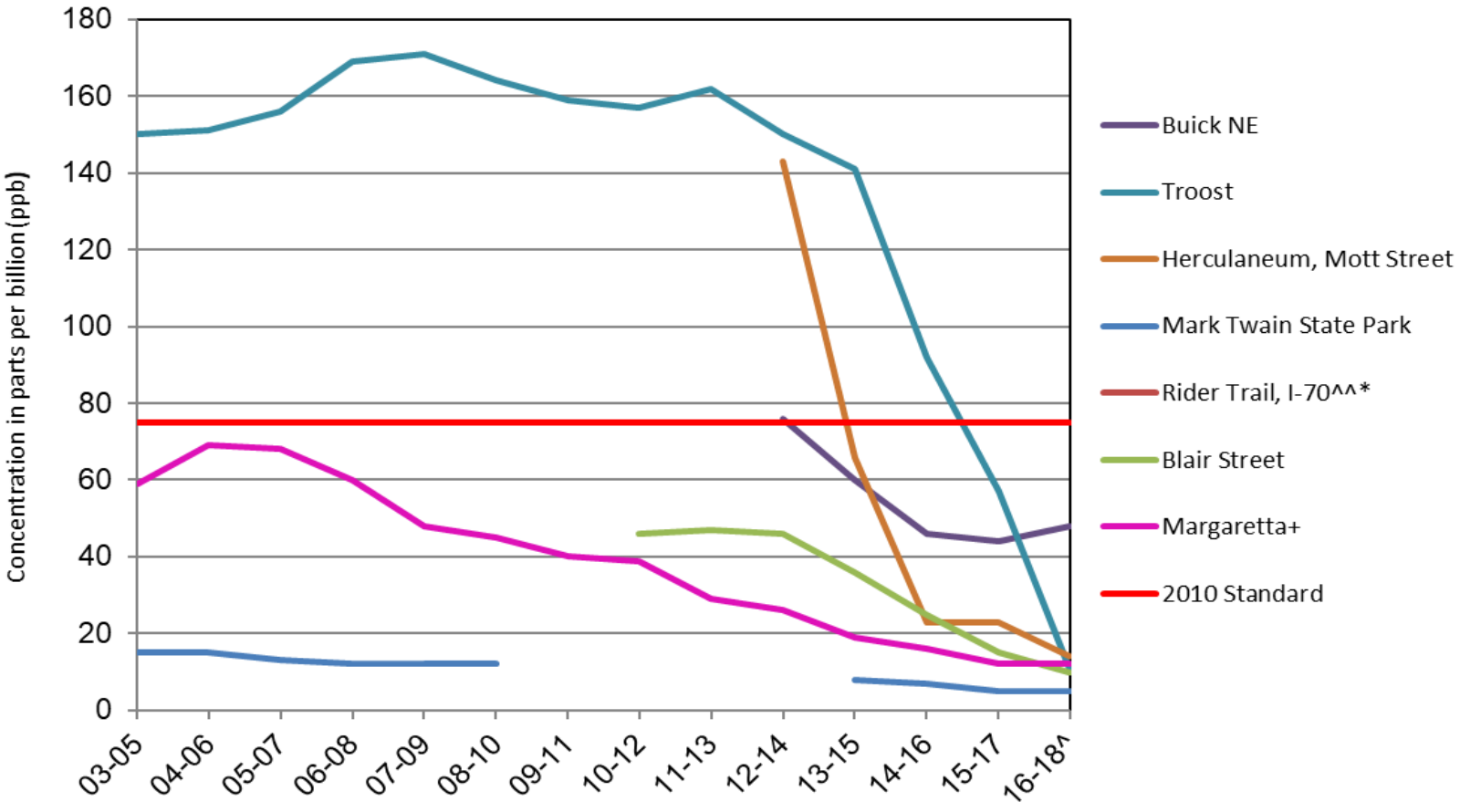
13 Buick NE (48)
14 Hwy 32 Northeast*~(49)
15 County Road 75*~(41)
16 West Entrance*~(39)

Outstate Area, MO

17 M7M Site #1-AECI Water Tower*~ (**125**)
18 M7M Site #2-East Graveyard*~ (**188**)
19 M7M Site #3-West Entrance*~25)
20 Mark Twain State Park (5)

^Quality assured data through December 31, 2018
"Special Purpose Monitor
**Industry Monitor*
+Monitor was discontinued on 12/31/2018
~Less than 3 years of data
Green: EPA's Data Requirements Rule Sites
M7M: Magnitude 7 Metals

Trends in Sulfur Dioxide (SO_2) Design Values for Missouri State Operated Sites, 2003-2018



^Quality assured data through December 31, 2018.
^^Rider Trail has been monitoring SO_2 for less than three years, so the dapartment cannot compare data to the standard.
*Special purpose monitor
+Monitor discontinued as of 12/31/2018

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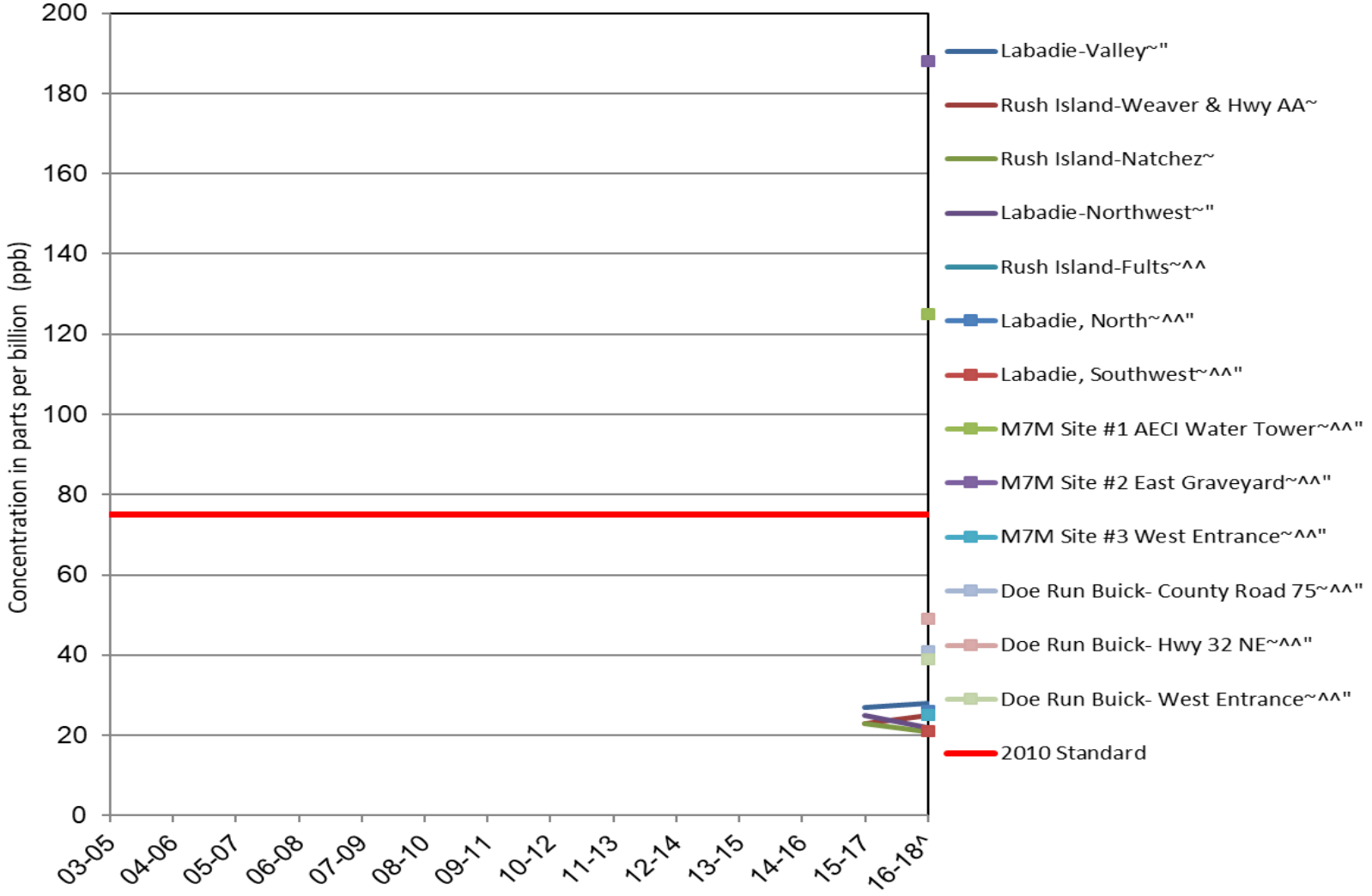
Trends in Sulfur Dioxide (SO_2) Design Values for Missouri Industrial Sites, 2003-2018



^Quality assured data through December 31, 2018.
~Industry monitor
^^Sites have been monitoring SO_2 for less than three years, so the department cannot compare data to the standard.
"Site associated with EPA's Data Requirement Rule (DRR)

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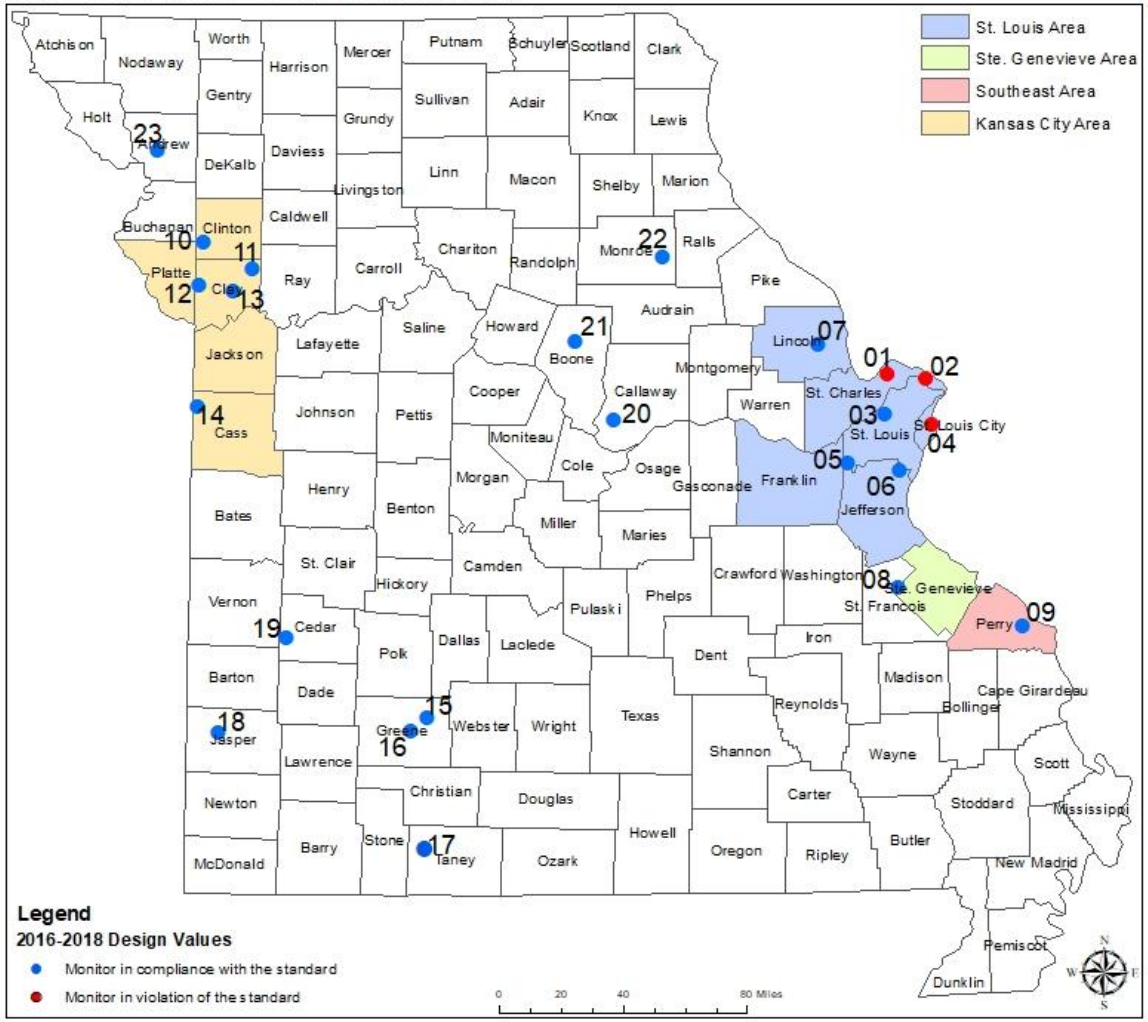
Missouri Statewide Ozone (O3) Monitoring Network, 2018

2015 8-hour standard = 70 parts per billion (ppb)



Site# SiteNam e (2016-2018 DV^)

St. Louis Area
- 01 Orchard Farm **(72)**
- 02 West Alton **(74)**
- 03 Maryland Heights (70)
- 04 Blair Street **(71)**
- 05 Pacific (66)
- 06 Arnold West (69)
- 07 Foley West** (67)

Ste. Genenieve Area
- 08 Bonne Terre (65)

Southeast Area
- 09 Farrar (67)

Kansas City Area
- 10 Trimble (68)
- 11 Watkins Mill (69)
- 12 Rocky Creek (70)
- 13 Liberty (69)
- 14 Richards Gebaur-South (63

Springfield Area
- 15 Fellows Lake (61)
- 16 Hillcrest High School (61)

Outstate Area
- 17 Branson-SPM* (57)
- 18 Alba (61)
- 19 El Dorado Springs (61)
- 20 New Bloomfield (62)
- 21 Finger Lakes (63)
- 22 Mark Twain State Park (60)
- 23 Savannah (63)

^Quality assured data through December 31, 2018
**Special Purpose Monitor (Closed October 31, 2017)*
*** Monitor relocated less than one mile from previous site*
Violation: Bold & Red

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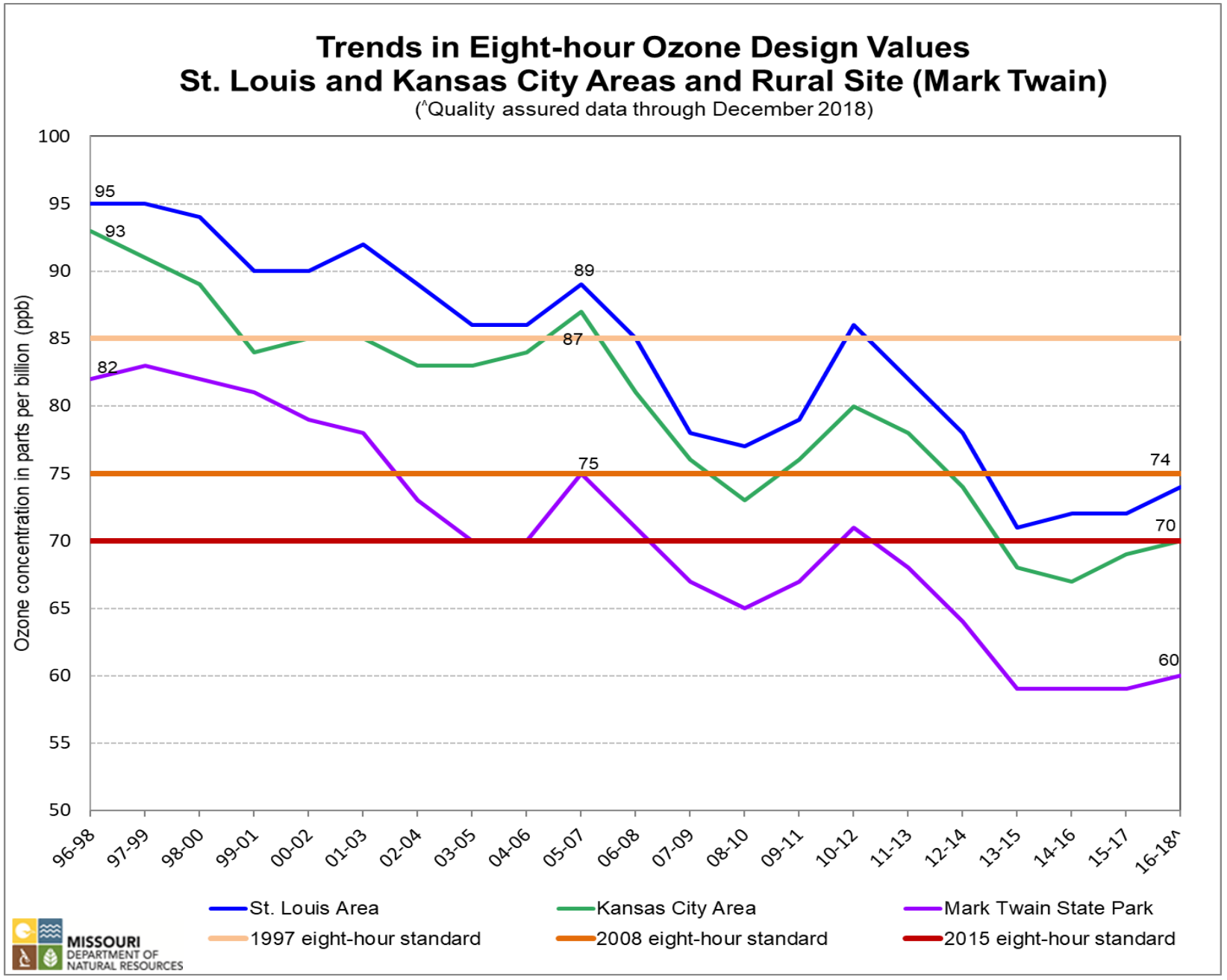
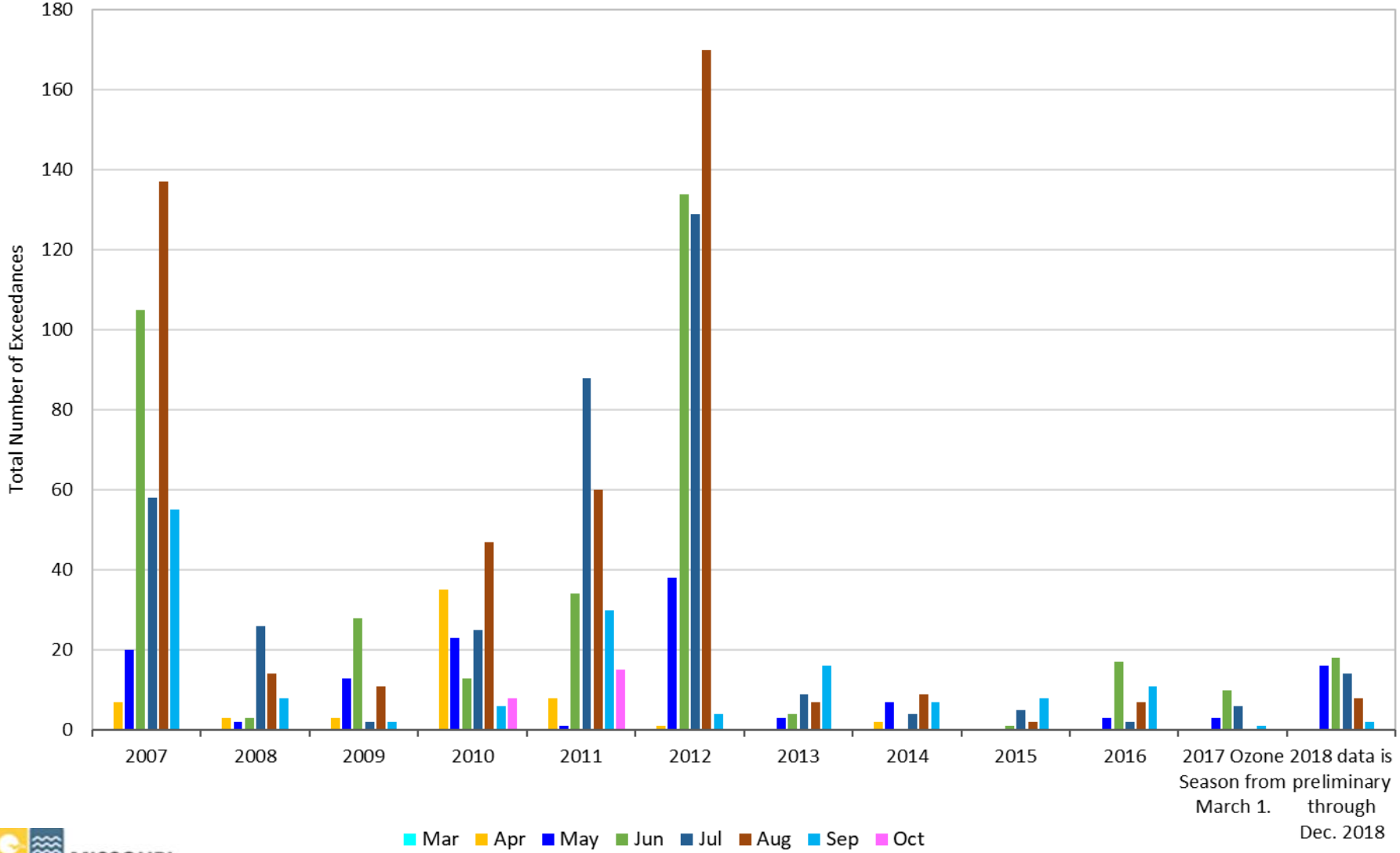
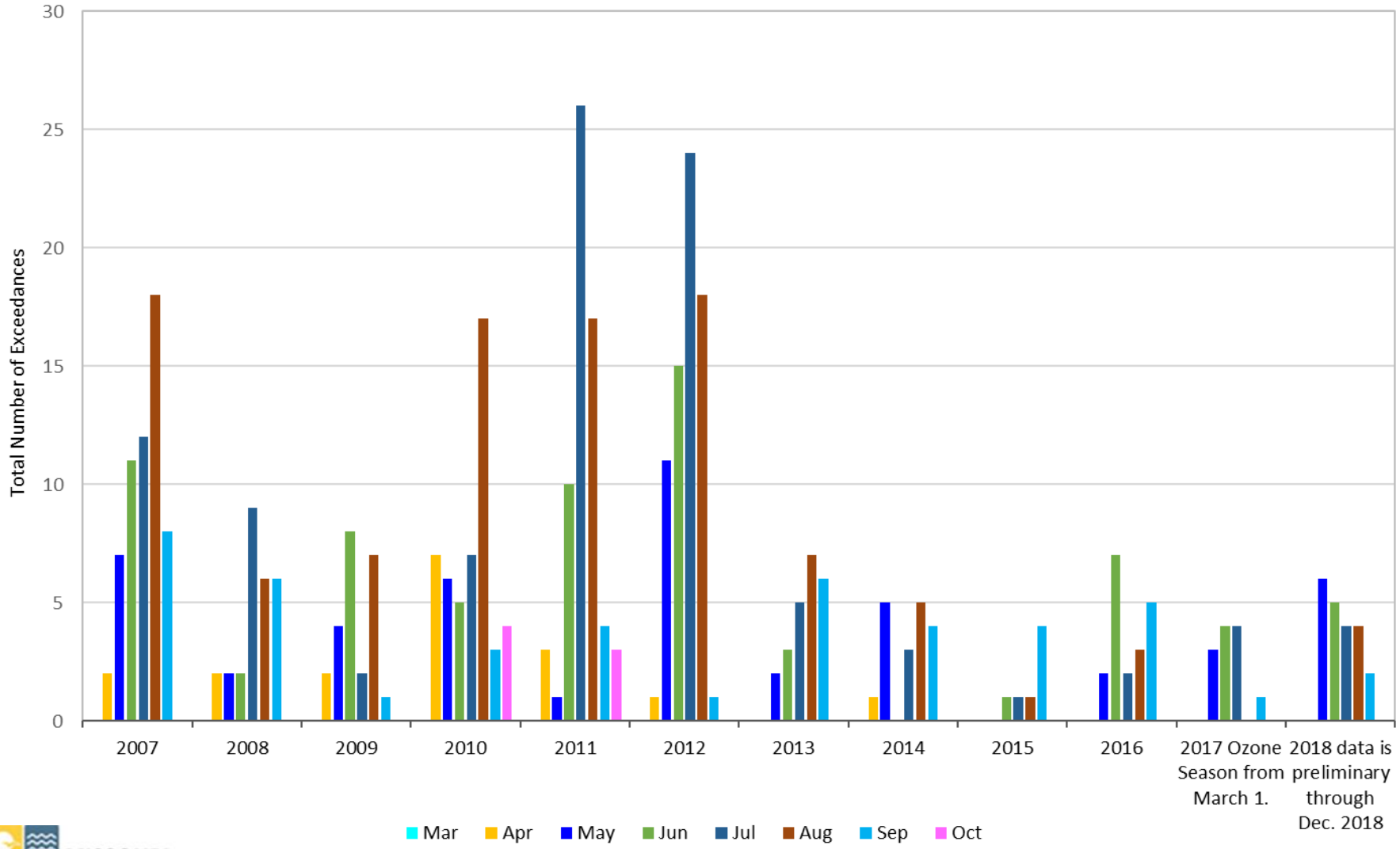

Trends in Eight-hour Ozone Design Values
St. Louis and Kansas City Areas and Rural Site (Mark Twain)
(^Quality assured data through December 2018)
Ozone concentration in parts per billion (ppb)
100
95
90
85
80
75
70
65
60
55
50
95
93
89
87
82
75
74
70
60
96-98
97-99
98-00
99-01
00-02
01-03
02-04
03-05
04-06
05-07
06-08
07-09
08-10
09-11
10-12
11-13
12-14
13-15
14-16
15-17
16-18^
St. Louis Area
Kansas City Area
Mark Twain State Park
1997 eight-hour standard
2008 eight-hour standard
2015 eight-hour standard
MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

Number of Ozone Exceedances (>70 ppb) by Year by Month at the Missouri State Air Monitoring Sites



MISSOURI DEPARTMENT OF NATURAL RESOURCES

Number of Days with Ozone Exceedance (>70 ppb) by Year by Month at the Missouri State Air Monitoring Sites



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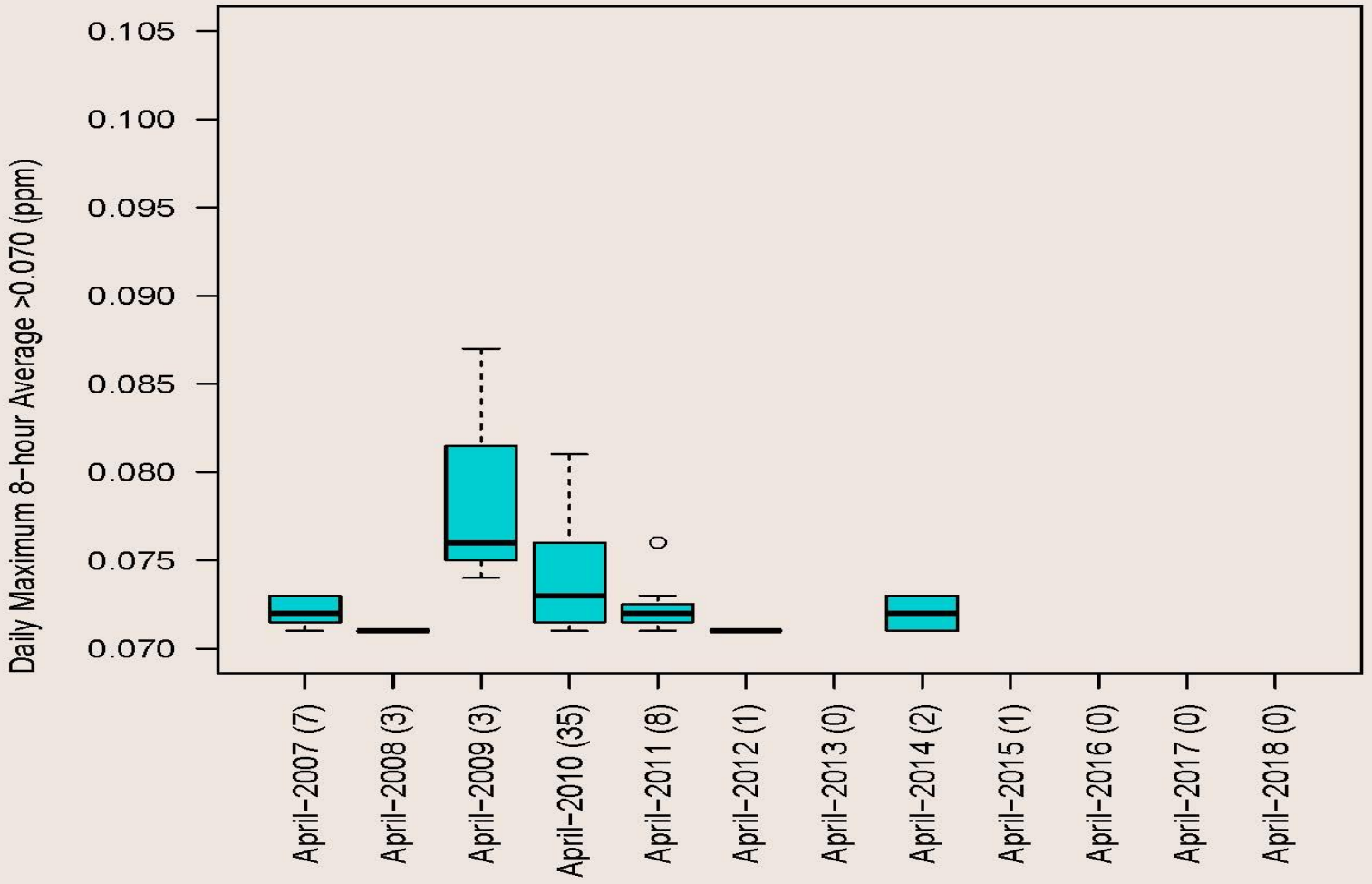

Numbers in parentheses are the total number of exceedances within the given month.
2018 data is preliminary.

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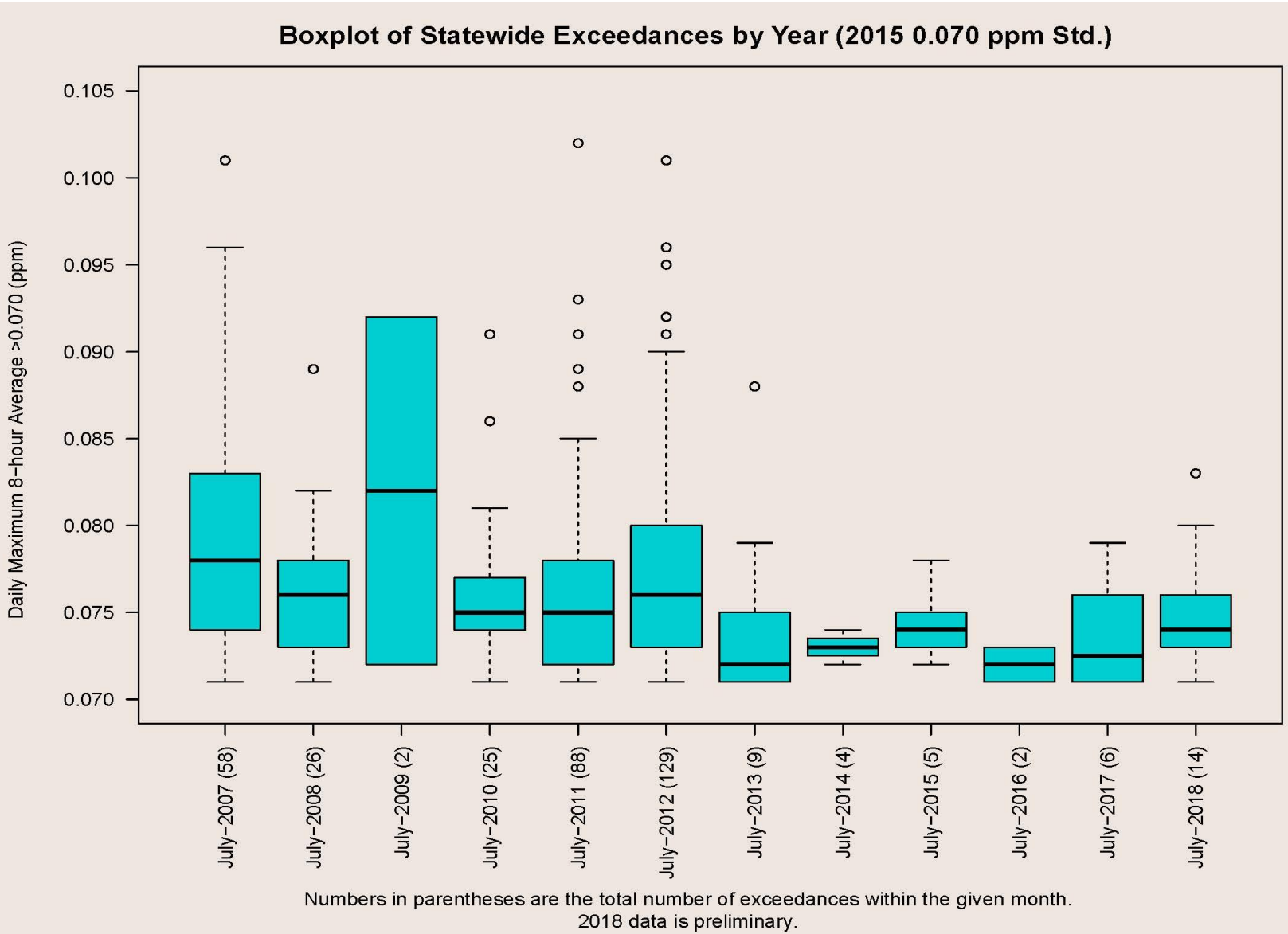

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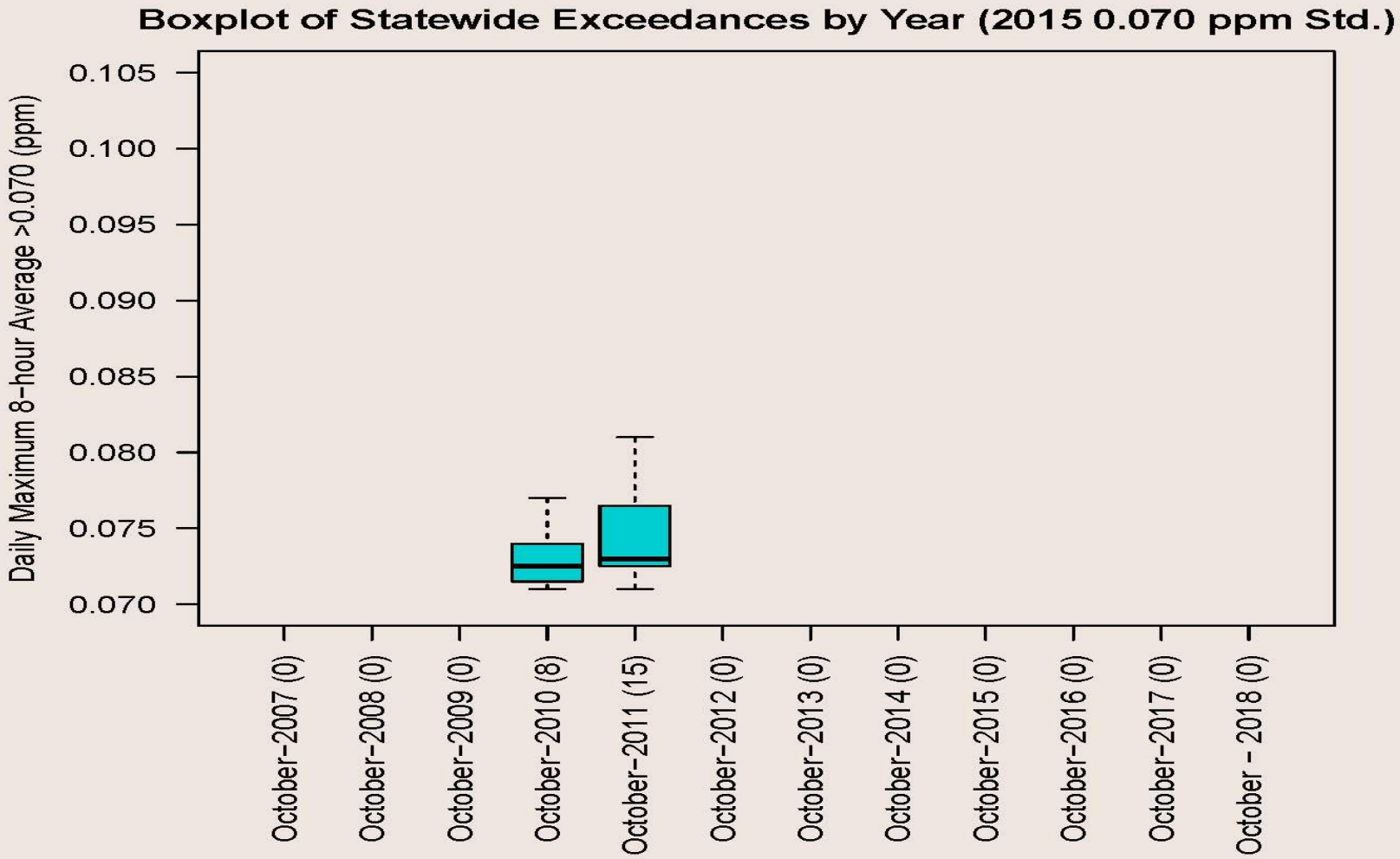

Numbers in parentheses are the total number of exceedances within the given month.
2018 data is preliminary.

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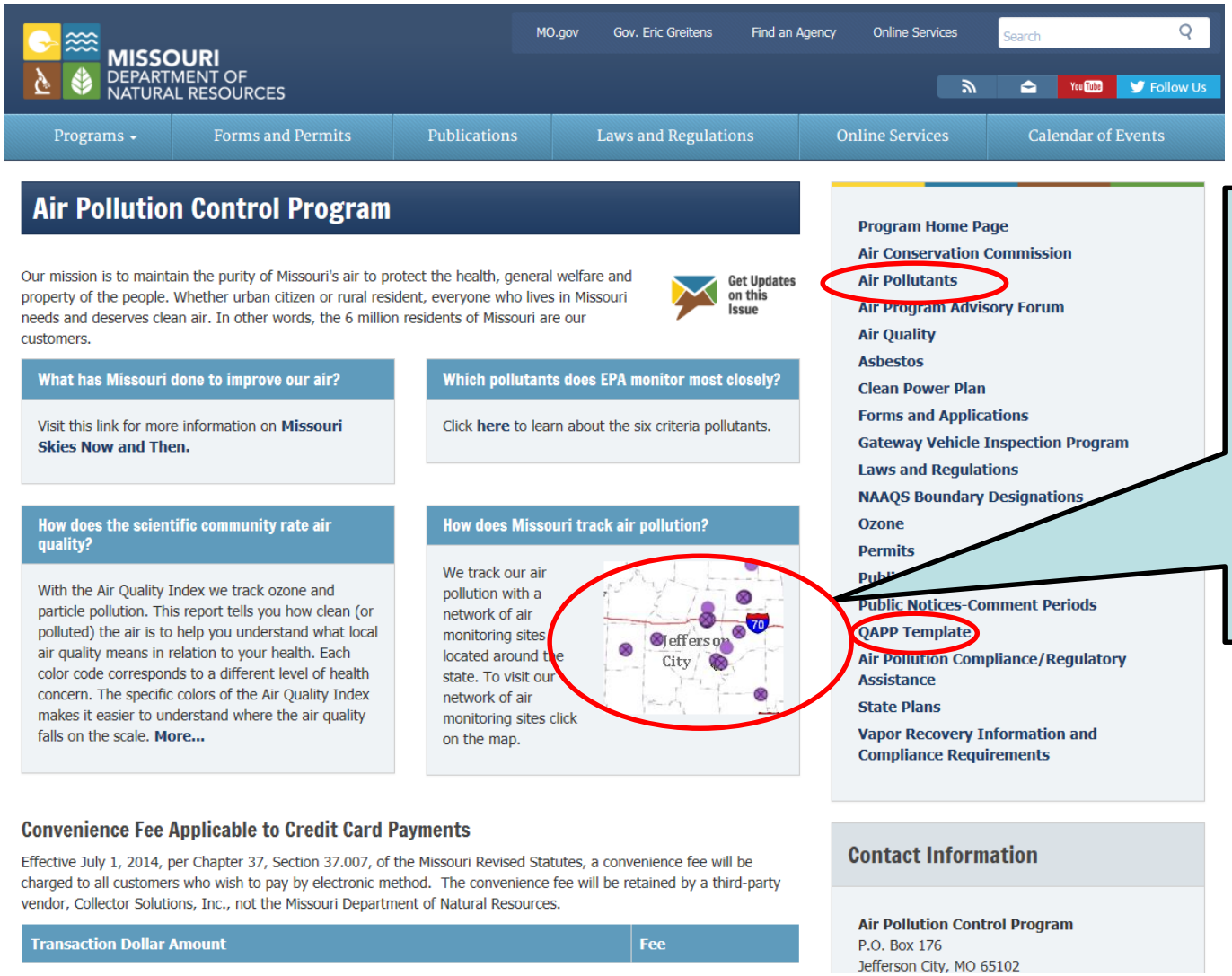
Website Resources



Monitoring Information- 'Bookmark'

- Design Value Reports
- Preliminary hourly data reports
- Monitoring Network Plans and More
- More improvements coming…

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How To Stay Informed

Public notices – rules, permits, state plans:

dnr.mo.gov/env/apcp/public-notices.htm

Air Program Advisory Forum:

dnr.mo.gov/env/apcp/airadvisory/apcpstakeholder.htm

Get Updates on this Issue

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Questions?

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